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THE GREAT WAR IN THE AIR

The Great War in the Air: By Edgar Middleton (late R.N.A.S.)

VOLUME III

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THE GREAT WAR IN THE AIR

VOLUME III

CHAPTER I

THE ROYAL NAVAL AIR SERVICE IN THE MAKING

The Zeppelin Hunters—The Dover Patrol—Naval Bombing Attacks—
Aircraft at Jutland—Zeppelins in the Great Battle.

IF the number of representatives of the Royal Naval Air Service who figured in the Honours Lists of 1916 was any criterion of accomplishment, and there is no reason to believe that this was not the case, the results achieved by the British naval airmen during the year proved invaluable. In those lists are to be found the deeds and records of incidents which occurred both at sea and ashore in all parts of the world. "Seaplanes under such circumstances are of distinct value," Sir David Beatty reported of the work of the only British aircraft which participated in the great battle of the Jutland Bank. Vice-Admiral Sir Reginald Bacon, commanding the Dover Patrol, speaks in a eulogistic account of the activities of the naval aircraft under his command, "by which the enemy submarine operations from the Belgian coast were much reduced." Of the untiring zeal and splendid devotion of the personnel, record is amplified in the many and remarkable honours they achieved. Lord Kitchener himself on February 17, 1916, in the House of Lords personally refuted the attacks made upon the operations of the British aviators "in another place," and of which he remarked: "No service in the field has, in my opinion, been more efficient."

In a dispatch dated May 29, from Vice-Admiral Bacon, there

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appeared a somewhat lengthy report of the work of aircraft with the Dover patrol. Extending its activities from Dover to Dunkirk, and thence on to Ostend, at this time in the hands of the enemy, this patrol was also responsible for the aerial defence of these islands. And throughout the home-defence campaign, which has been described at some length, in an earlier volume, there is a continuous record of daring deeds on the part of the naval airmen.

A splendid example is that of some hero unknown, who, one August dawn of 1916, chased a raiding enemy airship far out across the North Sea, all the time riddled with bullets, and only gave up the tenacious pursuit when loss of blood rendered him unconscious. It was at 5.15 in the morning that this great fight took place, thirty miles off the East Coast. The British pilot had fired over two trays of ammunition into the Zeppelin, when he was temporarily incapacitated by a portion of his machine-gun flying off and stunning him. When he regained consciousness the Zeppelin was nowhere to be seen, and he was therefore forced to return again to his base.

Deeds of the Anti-Zeppelin Patrols

Flight-Lieutenant Freeman made an equally determined attack upon a Zeppelin far out at sea; Squadron Commander Smith, Oliver and Flight-Lieutenant Glynn Hall, also on defence patrol, encountered and attacked the German cruiser fleet when it made its lightning attack on Yarmouth, on the morning of April 25, 1916. Glynn Hall was out on a routine patrol flight with an observer when he encountered the raiding squadron of enemy ships on their way to attack Yarmouth. Hopelessly out-gunned, he was soon wounded in the shoulder from shrapnel; and, weak from loss of blood, he barely succeeded in piloting the machine back to his station and landing safely. Earlier that morning Flight-Lieutenant Freeman had pursued a raiding enemy Zeppelin far out to sea—some fifty miles, to be exact—and only ran into the enemy fleet on his return journey. Wisely he refrained from attacking the main squadron, but contented himself with bombing the submarines which accompanied them, from a low altitude. So accurate was his aim that he forced them to submerge almost immediately. Finding

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then that the guns of the fleet were being trained on him, he turned and flew off home. At that moment Oliver came up, with a fresh supply of bombs and ammunition aboard, and chased the fleeing enemy far out across the sea, actually getting so near them as to fly along their line, dropping bombs, although all the time being subjected to the most intense anti-aircraft fire. And it was only the darkness which caused Freeman to refrain from chasing another Zeppelin when he had pursued it far on its homeward way. This was the occasion of the third determined attack he had made on the same enemy craft. While it was only after he had exhausted all his ammunition and his chances of being picked up in the event of falling into the sea becoming extremely problematical, that Oliver turned back. Throughout this action he evinced the greatest gallantry and skill.

Seaplanes played no very important part, either in these operations or in the operations of the aviators of the Dover patrol, the participation of the seaplane, piloted by Lieutenant Rutland in the Jutland Battle, being the one big event of the seaplane manœuvres during the year 1916. Meanwhile, Admiral Bacon, in his dispatch, gives a fair account of the activities of our aviators along the Belgian coast. "In addition to the daily reconnaissance and protective work performed by the Royal Naval Air Service on the coast," he reports, "eleven organised attacks against the enemy's aerodromes and thirteen attacks on enemy vessels have been carried out. Nine enemy machines and one submarine have been destroyed by air attack, and appreciable damage has been inflicted on military adjuncts.

"It is equally advantageous to maintain the offensive in the air as it is to do so on land or at sea. It is with considerable satisfaction, therefore, that I am able to report that, with only one exception, all the aeroplanes destroyed were fought over the enemy's territory, and that all the seaplanes were brought down into waters off the enemy's coast.

"The advent of spring weather has lately enabled me to take steps to limit the extent to which the submarine and other vessels of the enemy had free access to the waters off the Belgian coast.

"The success achieved has, so far, been considerable, and

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the activities of submarine operations from the Belgian coast have been much reduced."

The Dover Patrol

No finer tribute could have been paid to the ever vigilant patrols maintained by the handful of airmen stationed at Dunkirk, upon whose efforts depended the safety of the Channel ports, as well as some considerable portion of the East Coast. One naval pilot, Flight-Commander Beard, who was in the writer's opinion one of the surest and most capable of the naval airmen at this time, attacked German submarines on at least two occasions, and for months on end carried out almost daily anti-submarine patrols along the Belgian coast, for which he was most fittingly rewarded with the Distinguished Service Cross. Squadron-Commander Mulock, D.S.O., a Canadian and a most gallant fire-eater, was constantly employed at Dunkirk from July, 1915, until almost the end of the war, and displayed indefatigable zeal and energy. On several occasions in 1916 he engaged hostile aeroplanes and seaplanes, and attacked submarines; carried out attacks on enemy aerodromes in the intervals of combat, and also carried out innumerable long-distance reconnaissances. Squadron Commander Dallas, another Colonial, an Australian on this occasion, and an equally daring and capable pilot, in addition to performing consistently good work in reconnaissances and fighting patrols since December, 1915, was brought to official notice by the Vice-Admiral, Dover Patrol, for the specially gallant manner in which he carried out his duties. Amongst other of his exploits were the following: On May 21, 1916, he sighted at least twelve hostile machines, which had been bombarding Dunkirk. He attacked one at 7,000 feet, and then attacked a second machine close to him. After re-loading, he climbed to 10,000 feet and attacked a large hostile two-seater machine off Westende. The machine took fire and nose-dived seawards. Another enemy machine then appeared, which he engaged and chased to the shore, but had to abandon owing to having used all his ammunition. Squadron Commander Dallas, who afterwards was high in the running for chief British ace, was also awarded with a D.S.C.

This particular form of activity varied considerably in its

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nature, as may be judged from the following extract from an official report of the R.N.A.S., which was issued by the Air Board :—

"Dunkirk. On July 15 one of our seaplanes, a Nieuport, patrolled ten miles out at sea, and when approaching Ostend, at about 12,000 feet, encountered a German seaplane—a single-engine tractor type—500 feet below him.

"The enemy manœuvred for a position behind and below the Nieuport, both machines meanwhile executing a steep glide. The British pilot thereupon looped over the enemy, who passed underneath him. He thus gained the desired position behind, and opened fire into the seaplane at a range of 100 yards. The German pilot, who was evidently hit, made a vertical nose-dive. The machine was last seen in flames, falling headlong downwards."

On July 21 another naval airman—this time on a seaplane—when at 11,000 feet, encountered a hostile biplane on the Flanders front. The British pilot dived on the hostile machine, which, in the meantime, was manœuvring for position under his tail, opening fire at the same time. The machines met nose on, both firing, and passed each other at 20 feet range, our machine firing one tray. The hostile machine then turned and made for the coast. Our pilot followed, but owing to lack of petrol was forced to descend.

"On July 28 a British machine sighted a hostile aeroplane returning from Nieuport. Diving from 14,000 feet to 10,000 feet, and manœuvring to get the advantage, our pilot opened fire at close range. Unfortunately, whilst the attack was being carried out, the machine experienced a strong concussion, and, getting out of control, dived steeply and dropped, spinning some 2,000 feet. The pilot, with great difficulty, eventually regained control of his machine and made a safe landing. The machine was found to have the whole upper surface of the left-hand upper plane and two-thirds of the right-hand upper plane stripped of fabric. This damage was caused by the explosion of a shell close to the machine.

"As a last striking instance of this adventurous and unusual variety, may be cited a British aerial attack on October 20, when a naval single-seater aeroplane attacked and brought

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down a hostile kite balloon near Ostend. The balloon descended in flames. A similar machine engaged a large hostile double-engined tractor seaplane, shooting both pilot and observer. The seaplane side-slipped and dived vertically into the sea two miles off Ostend. The remains were seen later floating on the water. Both our machines were undamaged.

Autumn Naval Bombing Attacks

Of the actual attacks upon enemy aerodromes and military positions mentioned in the Admiral's dispatch, it may be said that during a period from July 30 up to November 20 as many as eighteen large and, from a military point of view, highly important, raids were carried out on positions behind the enemy lines. These raids included aerial attacks on such highly strategic enemy positions as the Hoboken submarine works near Antwerp, the benzine stores and barracks at Mulheim (Alsace), and two separate raids on the Evere Zeppelin sheds near Brussels, the main German base for raiding England.

The benzine stores and barracks at Mulheim were bombarded on July 30 by naval aeroplanes in conjunction with French aviators. The machines met with very heavy anti-aircraft fire, but succeeded in gaining their objective, and carried out a most successful bombardment. All of the pilots returned in safety, and almost a fortnight elapsed without any expedition of importance taking place.

It was on August 9 that Flight Sub-Lieutenants Harkness and Collet carried out an historic and unusually daring raid on the Evere airship sheds, on the outskirts of Brussels; and also on Berchem St. Agatha. At daybreak they set out from the Dunkirk aerodrome, and some ninety minutes later arrived over their objective. Collet immediately swooped down to a height of between 300 and 500 feet, under very heavy rifle, machine-gun, and shrapnel fire from all directions, and dropped eight bombs on the Evere sheds. Harkness could not descend so low owing to the very heavy anti-aircraft fire which he encountered, but nevertheless he succeeded in dropping some of his bombs on the shed, and then proceeded to Berchem St. Agatha, which he also bombed.

Evere was again bombed on several occasions during August

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and September; the Hoboken submarine yards on September 2; and Ghisteltes, the great enemy aerodrome, was severely bombarded at least half a dozen times by the naval air squadrons during the autumn. On October 25 took place the most important British air raid of the year, when eleven naval 'planes, accompanied by five French machines, bombed the Essingen works at Hagendinghem. The objective on this occasion consisted of blast furnaces and steel works, and was therefore of special interest from a naval point of view, as the steel which was produced there was used in the construction of big guns. Only two factory chimneys were left intact after the last bombs had been dropped, and the greater part of the works was put out of action for some considerable time. The particulars of the principal naval air raids of the autumn are as follows:—

<i>Date</i>	<i>Objective</i>	<i>Result</i>
July 30..	Mulheim benzine stores	Successful bombardment.
Aug. 9..	Evere airship sheds ..	8 bombs dropped from a height of 300 feet.
„ 18..	Lichtervelde dumps ..	48 bombs from 3,000 feet.
Sept. 3..	Ghistelles aerodrome ..	
„ 4..	Hoboken shipyards ..	
„ 7..	St. Denis Westrem aerodrome	Large number of bombs dropped.
„ ..	Ghistelles	
„ ..	Lichtervelde railway sidings and ammunition dumps	Made by an R.N.A.S. detachment near Nancy.
„ 22..	St. Denis Westrem ..	Attacked by naval aircraft.
Oct. 2..	Evere airship sheds ..	One British airship failed to return.
„ 12..	Obendorf	Combined French and British raid.
„ 25..	Essingen works ..	Blast furnaces and steel works.
Nov. 10..	Ostend and Zeebrugge	Great weight of bombs dropped.
„ 12..	Ostend	Bombs dropped on the Atelier de la Marine.
„ 15..	Zeebrugge and Ostend	Large petrol store set on fire.
„ 17..		Considerable weight of bombs dropped on.
„ 23..	Zeebrugge	Seaplane sheds bombed.

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The moral of Jutland Bank is to be found in the fact that within a month of its occurrence the Admiralty gave orders to Messrs. Vickers to recommence work upon the R9, the first British rigid airship. As early as December, 1913, the final designs of this craft had been submitted to the Admiralty. For three years they had hesitated to accept them. It was not until after the outbreak of war that orders for delivery were finally issued. In March, 1915, work on the R9 again was suspended, as the Admiralty Commissioners considered that the war would be over in a few months! And it was not until after the battle of Jutland Bank when, impressed by the invaluable assistance rendered the enemy fleet by Zeppelins during the battle, that the naval active service command began to urge upon the authorities the necessity for British rigid airships, and permission at last was granted Messrs. Vickers to resume work on the R9, while three further larger airships were commissioned.

At last—unfortunately for the country, too late—the Lords Commissioners had learnt their lesson. Their conservative prejudices and wooden-ship theories of tactics and strategy came tumbling about their ears like a pack of cards. They were faced with the undeniable fact that the work of the Zeppelins during the battle of Jutland had snatched the possibility of an overwhelming victory from Sir David Beatty's hands. While the total of available British aircraft for the battle was one seaplane!

Long before the two fleets came to grips the German High Command were well informed as to the disposition of the British units. For this reason, and assured by their Zeppelin commanders that the British Battle-Cruiser Squadron was at that time the only enemy in sight, and not merely screening the British Battle Fleet, the enemy gave action.

Advance squadrons of the German fleet first came into conflict with the British cruiser squadron. The German cruisers were immediately supported by the biggest battleships, which were close at hand. The more powerful British ships were too far from the advance squadron to take an immediate part in the fighting. Before they reached the scene the Zeppelins had signalled their approach to their own commanders, and the German fleet at once broke off the engagement and made for its bases.

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Throughout the action, as the Zeppelin scouts of the enemy moved continually over the fighting ships, it was obvious what was their mission, and that the enemy anticipated the main British forces as certain to appear. Heavily gunned and armoured, the German fleet closed in as much as possible, and the whole might of his battle fleet was turned on our battle-cruiser squadron during an action which lasted fully two hours.

As our ships swept into action, it was obvious from a report from the *Galatea*, at 2.25 P.M., that the enemy force was considerable, and not merely an isolated unit of light cruisers. "So at 2.45 P.M.," reports Admiral Beatty, "I ordered the *Engadine* (Lieutenant-Commander C. G. Robinson) to send up a seaplane and scout to N.N.E." This order was promptly carried out, and by 3.8 P.M. a seaplane, with Flight-Lieutenant F. J. Rutland, R.N., as pilot, and Assistant Paymaster G. S. Trewin, R.N., as observer, were well under way.

Probably no British unit throughout the battle showed a better record than did this seaplane-carrier ship, *Engadine*. After successfully completing the reconnaissance work, she towed the *Warrior* for seventy-five miles between 8.40 P.M., May 31, and 7.15 A.M., June 1, and was instrumental in saving the lives of her ship's company. In this respect Flight-Commander Rutland again greatly distinguished himself. During the transshipment of the crew of the *Warrior* to the *Engadine*, one of the severely wounded, owing to the violent motion of the two ships, was accidentally dropped overboard from a stretcher, and fell between the ships. As the ships were working most dangerously, the commanding officer of the *Warrior* had to forbid two of his officers from jumping overboard to the rescue of the wounded man, as he considered that it would mean their almost certain death. Before he could be observed, however, Lieutenant Rutland went overboard from the forepart of the *Engadine* with a bowline and worked himself aft. He succeeded in putting the bowline around the wounded man and in getting him hauled on board, but it was then found that the man was dead, having been crushed between the two ships. Lieutenant Rutland's escape from a similar fate was miraculous.

About this time the *Engadine* was forced to abandon the *Warrior*, owing to bad weather setting in and the latter vessel

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become unseaworthy. A further subsequent search for the *Warrior* by a light-cruiser squadron failing to locate her, it was concluded that she had foundered.

Previous to this gallant attempt to save the warrior, however, by 3.8 P.M. on the afternoon of May 31, on the first day of the battle, Flight-Lieutenant Rutland's seaplane was well under way, her first reports of the enemy being received in the *Engadine* about 3.30 P.M. Owing to clouds, it was necessary to fly very low, and in order to identify four enemy light cruisers the seaplane had to fly at a height of only 800 feet, within 3,000 yards of them, the light cruisers opening fire with every gun that would bear. This condition, however, in no way interfered with the clarity of their reports, and, in the words of Sir David Beatty, "both Flight-Lieutenant Rutland and Assistant Paymaster Trewin are to be congratulated on their achievement."

Zeppelins in the Great Battle

In an interview given to a representative of the Associated Press of America, after the battle, a naval officer of high rank at the Admiralty stated that "the Zeppelins did not play the part which was attributed to them. Only one appeared and remained in action a very brief time, retiring under heavy fire, evidently badly damaged. The weather conditions were such that it is doubtful whether any aircraft would have been of much service." This is a most curious misstatement of facts, in view of the overwhelming evidence, not only of neutrals, but of all ranks who actually participated in the battle. It can be said with assuredness that no fewer than six Zeppelins were employed by the enemy during the battle of Jutland Bank. One of these ships, the L24, was hit several times forward by British guns, and much gas was lost. L24 was only able to get home with her crew, of whom many were wounded. All her supplies were thrown overboard, and after a narrow escape she reached the Schleswig coast, the envelope at times sloping at an angle of 45 degrees. When rounding the southernmost point of Fanoe, the airship, over which the crew plainly had no control, drifted over some Danish villages, and finally passed over the village of Hom into German territory; while, according to the

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Daily Mail correspondent at Copenhagen, five other Zeppelins, in addition to the L24, took part in the battle.

A "middie" in one of the Grand Fleet battleships, in a racy letter home, writes of an encounter with yet another Zeppelin, as follows: "We engaged a Zepp, which showed an inclination to become pally. I think it thought we were Germans. Altogether it was some stunt. . . . At about 3 A.M. we sighted a Zepp, which was vigorously fired at. It made off 'Quam celerrime,' which means quick with a capital Q." Again, there is a romantic story concerned with the *Queen Mary*, which went down in the thick of the action. The *Queen Mary* engaged at close range a German battleship, and whilst her great guns were busy with her more powerful and better protected enemy, a super-Zeppelin was hovering over her head, showering bombs in an attempt to find a vital spot on the crack ship of our squadron. Busy as she was with her heavy guns, the *Queen Mary* and her gallant crew kept the anti-aircraft guns going. The story is that the Zeppelin was shot down in a blazing mass, and fell close to the ship, exploded, and was destroyed.

Returning to the course of the main battle, the battle cruisers came to grips with the large forces opposing them about five o'clock on the afternoon of Wednesday, May 31. Thereafter the contest between the outnumbered cruiser squadron and the enemy raged till there came from one of the enemy aerial scouts a message which caused the German fleet to change its course and attempt to seek shelter. The British Battle Fleet had been discovered approaching the scene of action at 'full speed.

Hurriedly the enemy sped away southward, receiving severe punishment at the head of his line, as his light cruisers sighted and engaged with the Third Battle-Cruiser Squadron. The enemy had already suffered serious loss in the fighting during the hours which had elapsed. It was well that certain powerful units were working with the battle cruisers in this phase of the struggle. Between them they and the battle cruisers had accounted for several ships. Our losses had also been severe, but, considering the heavy odds, not great. We had lost important ships, but the enemy's losses by that time had been sufficient to convince him that utter disaster was in store for him if he waited to oppose the British Battle Fleet.

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Throughout the desperate chase that ensued that night there were no fewer than six Zeppelins over the British fleet, and they were of enormous value to the enemy commanders in determining the positions of the British pursuing forces. Through the inky darkness their searchlights sought out the position of our fleet. The Zeppelins dropped bombs amongst the men of the torpedoed *Marlborough*, struggling in the water; while, dealing with the events of the following morning, June 1, Admiral Jellicoe reports: "The enemy, however, made no sign, and I was reluctantly compelled to the conclusion that the High Sea Fleet had returned into port. Subsequent events proved this assumption to have been correct. Our position must have been known to the enemy, as at 4 A.M. the fleet engaged a Zeppelin for about five minutes, during which time she had ample opportunity to note and subsequently report the position and course of the British fleet."

CHAPTER II

THE BATTLE OF THE SOMME

The R.F.C. in 1916—A House of Commons Inquiry—Six Months' Activity—The General Battle Situation—A Great Step Forward—First Stage of the Somme Battle—Five Days—British Attack on Second German Position—Thrilling Incidents of the Air Battle—An Aerial Achievement—The Men who Dared and Did—Some Incidents of the Aerial Victory—On the Road to Combles—Superiority of the British Airmen.

IN all the year the achievement of the Royal Flying Corps was greatest throughout the long-fought, desperate battle of the Somme. The statement is more significant than it would appear. After two black years of strain and anxiety, the tide of war had changed definitely in the favour of the Allies. The German had been baulked of his original objectives, Paris and the Channel ports. Certainly he was yet in possession of the larger part of Belgium, but to drive him back from there again into his own country would be now but a matter of patience and time. The Allied commanders very rightly permitted themselves a glow of satisfaction for that wonderful something attempted, and the more wonderful something done. The year 1916 was one supremely satisfactory to British arms; and especially so with regard to aviation.

Nothing which had occurred during the last twelve months had been more gratifying to the nation as a whole than the wonderful development of its flying services. The work of the airmen had proved one of the wonders of the war. Britain, which had entered the war least prepared of all the belligerent powers, by the end of 1916 had established a marked ascendancy over the enemy in the air. Every branch of British aviation had played its part in this signal success. The battle airmen had proved themselves to be fearless and enterprising antagonists. In the interim, the High Command had deve-

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developed a more or less definite policy of aerial attack and defence. The manufacturers, experts, scientists, designers, mechanics, and a hundred and one others responsible for the production of the modern aeroplane, had strained every nerve to better and amplify the output of fighting aircraft, and had succeeded beyond all expectations. In 1914 the German air service, in material, had been numerically superior to the combined air fleets of Britain and France. By the end of 1916 the numbers of machines in the possession of the Royal Flying Corps was greater than that of all the enemy squadrons.

A House of Commons Inquiry

In this respect, in the evolution of fast and stable aeroplanes a great deal of assistance had been rendered the aircraft manufacturers, both by the Royal Aircraft Factory and the National Physical Laboratory, the latter institution supplying the factory with invaluable data from the results of tests carried out in the matter of strains, stresses, air resistance and engine power. This co-operation between the two establishments was one of the outstanding features of the year. Another was the Royal Flying Corps Inquiry Committee, which had been appointed to consider certain charges against the efficiency of the Flying Corps, made in the House of Commons, by Mr. Pemberton-Billing, M.P. The Committee found these charges to be unjustified, and reported: "There has been an enormous expansion of the Flying Service since the war; and all the critics of the service, without exception, have borne testimony to the great progress made in its efficiency—a progress which, although most noticeable since the beginning of this year, is, in the opinion of the Committee, the results of months of strenuous work. To this efficiency the recent reports from the front bear witness."

Sir Douglas Haig's dispatches constantly added to this testimony. In his reviews of the various operations which took place throughout the year, and again and again in his daily reports, he referred to the great services rendered by the R.F.C. During the battle of the Somme, for instance, reviewing the British operations from October 3 to the 19th inclusively, the British C.-in-C., after laying stress upon the fact that the

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weather during that period had been consistently unfavourable for aircraft, heavy rains and strong south-westerly winds having lowered the visibility, continues: "Yet in spite of such adverse conditions, our machines have made many valuable reconnaissances, and have repeatedly attacked with success enemy lines of communications, ammunition dumps, and troops on the move. . . . Assisted by our aeroplanes, our artillery has continued to play a notable part in the fighting. It has established and maintained a clear superiority over that of the enemy. It has supported our infantry attacks, and has disorganised the enemy's arrangements behind his front lines, and hindered the arrival of his reserves and supplies. It allows him no rest by day or night, and materially assists in that wearing down of his moral which is vital to success in battle." Again, reviewing events between the 19th and the end of October, he reports: "Towards the end of the month the enemy artillery became more active, and enemy aeroplanes were more in evidence. This increased activity has been satisfactorily dealt with by our own guns and aircraft."

If it were even necessary, an equally significant testimony to this efficiency is supplied by certain grudging, though nevertheless remarkable, admissions on the enemy's part at this time. Included amongst these admissions was a captured document, emanating from a German Army Headquarters, which, in acknowledging the superiority of the British airmen, suggests methods of reorganisation whereby it is hoped that "it will be possible at least for some hours to contest the supremacy in the air of the enemy." No less convincing is a summary of the results achieved by the British aviators in the latter part of the year.

Six Months' Activity

During six months from June to November, as shown in the French and British daily, and in the incomplete reports of German Headquarters, were accounted for 666 enemy, as against 401 Allied—203 British, 198 French—aeroplanes. August, September and October respectively were active months in the air. Where in September—the heaviest month—the Germans lost 206 to an Allied total of 116, including

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48 British machines, in October the comparative losses were Allied 67, German 104. November was a lean month in the air. The following table gives the monthly losses from June to November.

						<i>British</i>		<i>French</i>		<i>German</i>
June	..	..	..	..	..	7	..	28	..	37
July	..	..	..	..	..	48	..	31	..	86
August	..	..	..	..	..	26	..	42	..	121
September	..	..	..	..	..	48	..	68	..	206
October	..	..	..	..	..	42	..	25	..	104
November	..	..	..	..	..	32	..	4	..	112
						203		198		666

If any further guarantee as to the accuracy of these figures is necessary, it is supplied, more than in kind, both by the memorandum already referred to, of General Sixt von Arnim, commanding the IVth German Corps, on the experiences of that corps in the battle of the Somme, and the following extract from a diary, found on a German soldier of the 125th Regiment, captured in Delville Wood. "During the day," he writes, "one hardly dares to be seen in the trench, owing to the English aeroplanes. They fly so low it is a wonder that they do not pull one out of the trench. Nothing is to be seen of our German hero-airmen, and yet the brilliant ratio is supposed to be twenty-one to eighty-nine. The fact that the English are a thousand times more daring was, however, not mentioned. One can hardly calculate how much additional loss of life and strain on the nerves this costs us. I often feel doubtful regarding the issue of our good cause when such bad fighters are there to champion it. No one out here needs to be foolhardy, but everyone has the duty and responsibility of so filling his place that he can always answer to his conscience."

Equally general, if more scientific, are the conclusions of General von Arnim. After making a number of recommendations for improving the German anti-aircraft establishments, he goes on to say: "The means for providing the artillery with aerial observation has proved insufficient. . . . The numerical superiority of the enemy's airmen and the fact that their

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machines were better were made disagreeably apparent to us, particularly in their direction of the enemy's artillery fire and in bomb-dropping. . . . The number of our battleplanes was also too small. The enemy's airmen were often able to fire successfully on our troops with machine-guns, by descending to a height of a few hundred metres. The German anti-aircraft gun sections could not continue firing at that height without exposing their own troops to serious danger from fragments of shells. This has produced a desire for the anti-aircraft defences to be supplemented by machine-guns. A further lesson from this surprisingly bold procedure of the English airmen is that the infantry make too little use of their rifles as a means of driving off aircraft."

The General Battle Situation

A fairly good estimate of the situation in the air at the time of the battle of the Somme may be gained from the foregoing remarks. At this time the British airmen held an undoubted ascendancy over a rival numerically superior in the matter of personnel. It was no outcome of chance, but a hard-won success, which was part and portion of, and as essential to the main British attack in July, as was that attack to the balance of military power at this time in Europe. And the better to understand this point, it will be necessary for us to undertake a brief review of the general battle situation as it appeared in July, 1916.

The principle of an offensive campaign during the summer had been decided on some months before by all the Allies. As the date on which the attack should begin, however, was dependent on many doubtful factors, a final decision on that point was deferred until the general situation should become clearer. While it was necessary to commence operations before the summer was too far advanced, it was equally urgent that a very large proportion of the officers and men of the new armies should be allowed time to complete their training. On the one hand, where the British armies were daily growing in numbers, and the supply of munitions was steadily increasing, the enemy, on the other, was continuing to press his attacks at Verdun, and both there and on the Italian front,

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where the Austrian offensive was gaining ground, it was evident that the strain might become too great to be borne unless timely action were taken to relieve it. Accordingly Sir Douglas Haig, in consultation with General Joffre, decided that the attack should be launched at the first possible moment.

By the end of May, however, the Austrian pressure on the Italian front had assumed such serious proportions that the Russian campaign was opened early in June. Though the brilliant successes gained by our Allies at once caused a movement of German troops from the Western to the Eastern Front, it appeared in no way to lessen the pressure on Verdun. It was agreed by the two great Allied commanders that the combined British and French offensive should not be postponed beyond the end of June.

The object of this offensive, according to Sir Douglas Haig, was threefold: (1) To relieve the pressure on Verdun. (2) To assist our Allies in the other theatres of war by stopping any further transfer of German troops from the Western Front. (3) To wear down the strength of the forces opposed to us. So great a manœuvre, however, required ample time for preparation. While the ground forces were being prepared for the coming ordeal, the offensive in the air commenced forthwith.

A Great Step Forward

It was a noteworthy event in the history of the war in the air; a tacit admission on the part of the supreme British command of the value of aircraft, which now, and in every great battle of the war which followed, entirely superseded the one-time cavalry screen in reconnoitring and establishing preliminary contact with the enemy. The order and nature of the aerial "push," after the great battle of the Somme, with the single exception of the introduction of contact patrols and long-distance bombing raids, never altered. The first objective of the airman was to blind the eyes of the enemy; to drive his fighting and reconnaissance machines from the skies over the area in which the advance was to be made. Followed the bombers to destroy where possible every point of strategic importance behind the enemy's lines; the reconnaissance

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machines to spy out the movements and dispositions of his troops and gun emplacements; the photography 'planes to better check the results achieved; and finally, at this time, the machines directing the fire of the heavy guns in the barrage immediately prior to the infantry attack.

By May 16 it may be said that, technically, the battle of the Somme had commenced. On that day no fewer than twenty-seven combats in the air took place. An Albatros—one of the latest of the enemy types of fighting machines—was attacked, driven down, and wrecked near Lille. Another was driven down north of Vitry in a damaged condition. A third, attacked by a British scout, was seen to turn upside down near the ground. At the same time a great deal of successful artillery and photographic work was accomplished. On the 17th there were thirteen aerial combats; a similar number on the 19th. And on the same day occurred a significant concentration of enemy squadrons in the neighbourhood of Courcellette.

This new development the British Staff were not long in defining. The enemy had information of the coming Allied advance, and was about to attempt a counter-attack. Every available British aeroplane was summoned to the region of the Somme. It would be fatal now if the enemy were to come over and spy out our battle positions.

Throughout the day of the 20th the fighting in the air reached a hitherto unprecedented stage of bitterness. An Aviatik fell on fire into some trees near Adinifer Wood, in the enemy's lines, one of its occupants being seen to fall out. Another hostile machine fell in flames near Contalmaison, also in the enemy's lines, after an encounter with one of our scouts. A third crashed to earth in our lines near Maricourt. Much successful artillery work again was accomplished early in the morning. By the morning of the 21st the effects of the hurried British concentration were beginning to make themselves felt. Eight enemy aeroplanes were driven off. And the German infantry endeavoured to rush our positions on the Vimy Ridge, south and south-east of Souchez. The result of the encounter was a small enemy gain of no strategic or tactical importance.

A second enemy counter-attack was delivered on June 2.

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However, in the interval, the British aviators were gradually but surely driving the enemy machines from the air. Fourteen enemy aeroplanes were engaged on the 27th, and one was driven down inside the enemy's lines in a damaged condition. The following day the British aeroplanes accomplished much useful work, while hostile aviators were noticeably inactive. And again on the 29th few German machines were seen in the sky. The enemy attack of June 2 was the last initiative movement on his part before the British advance.

Delivered on a front of over one and a half miles from Mount Sorel to Hooze, this attack succeeded in penetrating to a maximum depth of seven hundred yards. The lost territory was recovered on the 13th of the month, and British plans for the Allied advance went rapidly ahead.

One of the most remarkable features of this elaborate preparation undoubtedly was the co-operation of the Royal Flying Corps. While the airmen were battling fiercely overhead, vast stocks of ammunition and stores of all kinds were being accumulated within a convenient distance of the British front; miles of new railways and trench railways were being laid down; roads were being improved, many new ones made; and long causeways built over marshy valleys. The brilliant series of victories achieved by our flying men served the double purpose of preventing enemy scouts from ascertaining our own movements, whilst, at the same time, keeping the British Staff hourly posted as to his own. The amount of spade-work carried out in the air during this brief space of time was tremendous; the better part of the enemy's positions being only visible from the air.

Early in June the enemy's position was of a very formidable character. During nearly two years' preparation he had spared no pains to develop an elaborate system of defence. This consisted of three lines, situated on a high, undulating tract of land, which rises to more than 500 feet above sea-level and forms the watershed between the Somme on the one side and the rivers of south-western Belgium on the other. Well down the forward slopes of this face on the southern side, the general trend of which is from east-south-east to west-north-west, the enemy had established his first system of defence. This system

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started from the Somme near Curlu, and ran at first northwards for 3,000 yards, then westwards for 7,000 yards to near Fricourt, where it turned nearly due north, forming a great salient in the enemy's line, and a weak spot for aircraft observation.

Some 10,000 yards north of Fricourt, in the words of Sir Douglas Haig, the trenches crossed the river Ancre, a tributary of the Somme, and still running northwards passed over the summit of the watershed, about Hébuterne and Gommecourt, and then down its northern spurs to Arras.

On the 20,000 yards front between the Somme and the Ancre the enemy had a strong second system of defence, sited generally on or near the southern crest of the highest part of the watershed, at an average distance of from 3,000 to 5,000 yards behind his first system of trenches.

The first and second systems each consisted of several lines of deep trenches, well provided with bomb-proof shelters and with numerous communication trenches connecting them. The numerous woods and villages in and between these systems of defence had been turned into veritable fortresses. The deep cellars usually to be found in the villages, and the numerous pits and quarries common to a chalk country, were used to provide cover for machine-guns and trench mortars. The salients in the enemy's line, from which he could bring enfilade fire across his front, were made into self-contained forts, and often protected by mine-fields; while strong redoubts and concrete machine-gun emplacements had been constructed in positions from which he could sweep his own trenches should these be taken. These various systems formed, in short, not merely a series of successive lines, but one composite system of enormous depth and strength. Behind his second system of trenches also the enemy had several other lines already completed.

First Stage of the Somme Battle

Never was a countryside more unsuited and difficult for reconnaissance from the ground. Upon the meagre information supplied by outposts, the big British advance could never have gone through. Even from the air the contour, deeply

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ravined and covered with masses of thick woodlands, was a difficult one on which to report with any degree of accuracy, and then only by flying at a dangerously low altitude. Woods, pits, trenches and heavily defended buildings, invisible from the level, to the alert, trained eye of the aerial observer stood out in the boldest relief. It was an aeroplane reconnaissance which first brought in the information that the enemy was hard at work strengthening and improving his reserve lines, and digging fresh ones still farther back. It was only from the air that observation of the Germans' well-nigh impregnable system was possible; from the ground nothing could be seen of his more distant defences. In the fourteen days of the first stage of the battle, the aircraft were at work incessantly; scouting far out over the enemy's country, reconnoitring and destroying. On the first day an important railway depot was attacked with powerful bombs, a large number of other bombs were dropped on railway junctions, batteries, trenches and other points of military importance in the enemy's lines. One of our machines attacked a railway train on the line between Douai and Cambrai. The pilot swept down to below 900 feet and succeeded in dropping a bomb on one of the coaches, which exploded. Other pilots saw the whole train in flames and heard further explosions.

Co-operation with the Infantry

The Royal Flying Corps also was very active in co-operation with the infantry attack. The British main front at this time extended from Maricourt on the right, round the salient at Frigourt, to the Ancre in front of St. Pierre Divion. The better to assist the infantry attack, simultaneously the aeroplanes carried out an intensive series of raids on the enemy's reserves, artillery emplacements and trenches north of the Ancre, as far as Serre inclusive; while further north another aerial attack was made on both sides of the salient at Gommecourt. Numerous enemy headquarters and railway centres were bombed, while in one of these raids our escorting aeroplanes were attacked by twenty Fokkers, which were driven off. And in addition to these varied activities some long-distance reconnaissances were carried out, in spite of numerous attempts

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by enemy machines to frustrate the enterprises, and the British kite-balloons were in the air the whole day.

In the succeeding days of the first stage of the battle the aerial attacks were continued on similar lines, while but for the unfavourable weather conditions which set in on the night of the 8th, this aerial assistance might have been as great as it was in the next two stages. Meanwhile much was accomplished. While the bombers attacked vital points in the enemy's lines of communication, destroying urgently needed supplies of ammunition, other aviators directed the fire of the heavy guns for the barrage, a daily preliminary to the infantry attack. Aerial observers first reported the road clear into Mametz, so that by July 4 the infantry had consolidated their positions along the railway north of that village. And to sum up the results of the fighting during these five days in the words of Sir Douglas Haig: "On a front of over six miles, from the Briqueterie to La Boisselle, our troops had swept over the whole of the enemy's first and strongest system of defence, which he had done his utmost to render impregnable. They had driven him back over a distance of more than a mile, and had carried four elaborately fortified villages."

In all, during this great battle which went on for almost six months, there were three distinct stages. The first attack, which has already been described, was succeeded by desperate fighting for many weeks. The enemy, now fully alive to his danger, and having found his strongest defences unavailing, put forth his utmost efforts to keep his hold on the main ridge, and but for the splendid work that was accomplished by the R.F.C. might have succeeded in his objective. This stage of the battle constituted a prolonged and severe struggle for the mastery of the skies between the contending aircraft. Meanwhile, by the first week in September, the infantry had established a fighting superiority that had left its mark on the enemy, of which, according to the British official, possession of the ridge was merely the visible proof.

Third Stage Activities

The way was thus opened for the third stage, in which the British advance was pushed down the forward slopes of the

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ridge and further extended on both flanks until, from Morval to Thiépval, the whole plateau and a good deal of ground beyond were in our possession. On July 24 commenced the final bombardment, a large force of artillery being brought into action for the purpose. On the 25th the Royal Flying Corps carried out a general attack on the enemy's observation balloons, thus depriving him for the time being of this form of observation.

In the interval, however, much had been accomplished from the air. Almost a week elapsed, save for one strenuous twenty-four hours on July 15, during which the British aviators succeeded in bringing down four Fokkers, three biplanes and a double-engine plane, without the loss of a single machine, before our airmen again got into their full stride. On July 20, the day of the first attempt on Guillemont from Trones Wood, the Flying Corps, taking advantage of the fine weather, resumed the series of intensive bombing raids on the enemy fortified positions, and at the same time carried out innumerable flights in mid-air. Previously one hostile aeroplane had been destroyed, and several others were forced to the ground in a damaged condition. Hostile aircraft were inactive until the evening, when a good deal of fighting took place behind the German lines. One of our offensive patrols encountered eleven German machines, as the result of which three enemy aircraft were shot down, one bursting into flames. Another encounter between four of our machines and six of the enemy's lasted for forty-five minutes. One Fokker was then shot down, and on another being badly damaged by our fire the remaining four broke off the fight, while during many other combats in the air a fifth German aeroplane was forced to the ground. Our total loss during that day was only one machine.

By day and by night for over a week—July 20-27—the British bombing planes maintained an incessant attack on enemy railway centres, aerodromes and other points of military importance, south of Bapaume; many tons of bombs being dropped. In the grand assault which culminated with the capture of Pozières, it may be said that the feeble resistance offered the British infantry at many points in the line was solely due to the aircraft attacks which had prevented the

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enemy from bringing up reinforcements and fresh supplies of ammunition in time. And while the bombers were busy, the fighting patrols were equally active in warding off attacks on the part of hostile aircraft.

As an example of this splendid co-operation between the photographic and bombing sections of the R.F.C. may be quoted an incident which occurred on July 20. It is by no means an isolated case concerning the daring of the British aviators at this period; four British machines attacking eleven enemy craft, a single-handed attack on ten German aeroplanes, a photography machine bringing down an enemy Roland by side-slipping over Leuze Wood, and a bombing expedition swooping down to within 2,000 feet of the ground to make sure of their objectives are but a few of many instances selected at haphazard.

Thrilling Incidents of the Air Battle

It was about 6.15 P.M. on the evening of July 20 that four British aviators encountered an equal number of Fokkers accompanied by two biplanes. A fight which lasted for nearly three-quarters of an hour ensued. Eventually one of the Fokkers was driven down and destroyed; a second went away hard hit, and the whole formation was dispersed. Our machines returned undamaged, though one pilot was wounded.

Between 8 and 9 P.M. the same evening an offensive patrol of four of our machines encountered a hostile formation of eleven machines, which included L.V.G.s, Rolands and Fokkers. Our leading machine first dived at an L.V.G., which made off to the east, and then attacked and drove down a Fokker. It was then attacked by a Roland, but, out-manceuvring it, drove it down. Our second machine had meanwhile closed with another Roland, which was driven down out of control. In this combat two Fokkers, which were about to attack, nearly collided. Our third pilot, who was at a lower altitude, having disposed of a Roland, which fell in a spinning nose-dive, was attacked by a Fokker, and, in consequence of his engine having been hit, he was unable to out-manceuvre it. He therefore descended in a steep spiral. Our fourth pilot observing this dived to the rescue and engaged the Fokker

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at the height of 1,000 feet above the trenches. The Fokker fell to the ground and burst into flames.

Eventually all the hostile machines were dispersed, the destruction of the three enemy machines being confirmed by independent witnesses.

The following day much successful co-operation with artillery was carried out; ninety-two targets were engaged with aeroplane observation and twenty-five with kite balloon. Several direct hits on gun emplacements were obtained, the ammunition in one continuing to explode for over half an hour.

One of our machines, engaged on photographic duty, was attacked by a Roland, which was level, and then dived and attacked under the tail of our aeroplane. Our aeroplane side-slipped till level with the Roland, and fired three drums into it at forty yards. The enemy plane fell to the earth near Leuze Wood.

Another of our aeroplanes, whilst on artillery patrol at 4,000 feet, saw eight hostile aircraft at a height of 9,000 feet. The British pilot climbed to this height and was joined by five of our fighting machines. At this juncture the enemy were joined by five L.V.G.s and two Fokkers. Our machines all attacked the somewhat scattered enemy formation. A section of three of our machines dived on to one party, of which one Fokker plunged to the earth from a height of 7,000 feet and two other machines were forced to land. Another machine was seen to fall out of control into a village, and yet another fell to earth in a field. The fighting lasted over half an hour, when the remaining enemy machines flew off in twos and threes.

The total of hostile machines brought down on this day was six, and at least three more were driven down damaged.

For six days the air war waned considerably, then at 12.30 P.M. on the afternoon of July 27 four British bombing planes, armed with heavy bombs, set out to attack an important railway centre on the enemy's lines of communication, where large quantities of ammunition had recently been reported. East of the line clouds were below 5,000 feet, which considerably favoured the expedition. The bombing machines

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arrived over their objective between 2 and 2.30 P.M., and all four machines descended to heights of from 2,000 feet to 4,000 feet to drop their bombs. The station, which was crowded with rolling-stock, and the sheds, containing ammunition, were attacked. Both sheds and rolling-stock were hit, and fires were seen to be started at four different points by our pilots, who remained circling round.

The expedition was practically unmolested by anti-aircraft guns or hostile aeroplanes, and all our machines returned safely and landed on their home aerodrome within four minutes of one another.

Bombing, fighting and reconnoitring in the air, continually advancing on the ground, the British forces went on from one brilliant success to another. The battle for Pozières had concluded by July 26, the Australian and Midland divisions joining hands in the cemetery. The Germans, however, still held the windmill, which was on higher ground and gave them a good observation point, in rear of which they steadily proceeded to reinforce and at the same time heavily bombard the British lines. The countryside appeared to be smothered monotonously in smoke and fire; the dangers to which the British troops were exposed were manifold. Then, on July 30, the R.F.C. put in a happy day over the German lines; dropping over seven tons of bombs on communications and billets. In one case a train was blown up, in another an ammunition depot was set on fire, and a hostile aeroplane on the ground destroyed. There were many aerial combats, and several enemy machines were driven to the ground in a damaged condition. Again the way was made clear for the infantry attack; desperate fighting taking place around Longueval and in Delville Wood. On Thursday, the 27th, the wood was cleared all but its eastern side, and next day the last enemy outpost in Longueval village was captured.

An Aerial Achievement

On the day of the encounter with the Brandenburgers in this same locality, July 28, above the fighting troops occurred one of the most gallant feats of this aerial campaign. For some time past weather conditions had been all against

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aviation; but on the 26th the sun broke through the clouds, the mist cleared away, and the lithe, drab forms of the battling aircraft commenced to dot the horizon in all directions. This temporary spell of inactivity had served to restore the badly shaken moral of the enemy's aviators. For the first time since July 1 German aeroplanes flew over the British side of the lines and dropped some bombs.

One of our airmen fell in with one of these enemy marauding squadrons of twenty machines, and attacked them single-handed; being wounded in the encounter with the first machine, but nevertheless succeeded in forcing three of them to the ground. The unequal combat was witnessed from the ground, and he was seen after the first encounter to lose control of his aeroplane, and it looked as if he would have to come down. He regained control, however, and returned to the attack, and then drove down two other victims before the others fled.

The net result, as also it was one of the most satisfying sights to be found in the ground taken from the enemy in this area by the British surface forces, was the utter destruction and wreckage of every trench, line, gun emplacement, communication, depot, ammunition park and headquarters, not to mention the shattered debris of innumerable aeroplanes brought down, within the range of the bombs and attacks of the British aviators. "Mametz Wood, to give one instance," wrote Mr. Beach Thomas on August 7, in a graphic account of the results of the desperate fighting between Pozières and Contalmaison, "still harbours gun wreckage in quantity, but one particular broken battery boasts some spectacular virtues of its own and points the moral of the meaning of a master air service. On occasion when the light was good our airmen have guided the firing at as many as eighty such targets within the day. They have seen in our neighbourhood no fewer than seven gunpits destroyed within the day by our heavy guns, and throughout this offensive their courage, activity and skill in observation have been the chief agent in knocking out one German battery after another.

"Sometimes they are disturbed by other aircraft as well as by Archies. The other day five German planes were seen flying high along the Albert-Bapaume road, where the chief

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battle was raging. Though still well over German country they were at once challenged and charged by four of our planes and sent helter-skelter. Twice lately along this same road our airmen have swooped down to a few hundred feet and fired their Lewis guns at enemy's transports and moving troops, causing something like a panic.

"During the last week our men have flown to within twenty yards of the enemy's craft in order to make sure of the shot. By such insistence on the offensive they have won the mastery, and the prize of mastery is artillery observation.

"The bombing attacks are more spectacular, especially those delivered as far away as Mons. In one of these a train was hit while in motion and broken in pieces. During last week such an explosion was caused by one of the hundredweight bombs that the machine, flying at a height of over a mile and a half, was bumped and rocked by the disturbance of the air. And these bombers show the same aggressive fighting quality as the fighters proper. As a rule, even when flying 100 miles from their base they swing round their target to see the effect of the shot. Blind work is no good to them.

"Whenever you are along our battle front about the hour of dawn you see and hear our planes shooting out eastwards to bomb or fight or observe. They crowd enemywards like fleets of trawlers seawards; and each day they catch fish: many fish if the air is clear; a few fish if the clouds are low or the 'subsoil' covered with haze.

"Their value to the gunners is altogether beyond estimate—though I must not forget the similar services of that other denizen of the air known as Rupert, which is the kite balloon. It is, I think, not too much to say that the aeroplane has enabled us to make gunners six months quicker than we could otherwise have made them. Our 'prentice gunners have always given proof of great quickness in learning the arts of laying and fuse-setting; but firing with precision to a map is an art that needs a longer apprenticeship for all men who are not gunners born. Thanks to the airmen, the amount of such blind shooting has been progressively reduced. The 'Eyes of the guns' multiply in number and increase in quality of scientific vision."

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The Men who Dared and Did

Even more entertaining is Mr. Beach Thomas's description of the amazing psychology of these wonderful young men of the R.F.C. "They are a new type of men," he continues, "these pilots and observers of the Royal Flying Corps. It is difficult to place them or to account for them. They seem to have been born to fly. For the most they are very young men—boys of nineteen and twenty—though older men twice their age and more are found here and there, having come out of professions like the law and the Civil Service, and taken to the air like ducks to water, but surprised at themselves. The younger men are clean-cut, fine and delicately made fellows, as far as I know them, rather highly strung and nervous in temperament.

"It is quite curious that many are men of great musical talent. In one squadron I know there are nearly twenty men who are all very full of musical talent. One of them, a stripling, came out of the trenches to volunteer as an airman, with long screeds of music which he had written down 'out of his head,' as children say, without hearing a note of it played until he came back. At night, when dusk creeps across the sky, and one by one the homing birds fly down (there is always an anxious question after the squadron commander, who is the best beloved), the flying men settle round the piano in the aerodrome, and one of them brings out his violin and plays it with a master touch, and another sings in a bass voice that might be heard one day at Covent Garden, and through the evening the men take turns at the piano, to play what comes into their heads, and out of their hearts. This link between music and flight may be a coincidence in the case of one squadron (though I have heard of it elsewhere), but it may be that flight is the new music of life, and that the imagination of the younger generation is soaring upon real wings, inspired to flight by the deep chords of emotion that in earlier days went into sound and colour. The pity is that just now they are instruments of death.

"They have amazing adventures up there in the sky, and learn strange things. They learn the look of the great country below, so that every landmark is familiar to them, and any

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strange flash or shape is detected at once, and those things they must learn in three different scales of light, morning, afternoon and evening, because at each of those times the landscape and the shape and shadows of it are quite different. They fly above the bursting shells and the tumult of war, but hear nothing of it unless they come down very low, for the humming of their engine is a great song in their ears. But they hear the 'Archies,' which make the puff-clouds above them, and sometimes, but not often, the scream of great shells going by them. A friend of mine had a queer and frightful experience of this not long ago. He was flying fairly low when he saw coming straight for him three-quarters of a ton of metal, in the shape of a shell, and heard its whining note, and was tossed, as though in a rough sea, by the rush of the wind it made. It was a shell from one of our 15-inch Grannies, and this pilot who met it on its way within 100 yards was annoyed for the moment with the gunners below who had not worried about the bird in the sky, which was my friend."

Some Incidents of the Aerial Victory

Thus the epic of these great days of the British airmen from a master pen; description is dwarfed by fact after fact, each one more amazing than the last. As the tide of the great battle swept on, by air and by land, the keener, closer, and more invaluable grew that splendid co-operation between the aviator and the P.B.I.* On the night of August 4, the second anniversary of the war was fittingly celebrated by the last spirited infantry charge into Pozières and four hundred yards beyond; the Australian division advancing on the right at the Windmill, and a New Army division on the left. The enemy trenches, which had been almost obliterated, his gun emplacements, which had been destroyed beyond repair by the pilots of the Flying Corps in a single night, were carried at a rush, and before the darkness came we had taken the rest of the second position on a front of 2,000 yards.

That night of August the first thirty-two heavy bombs were dropped on the dump at Corons; the railway track, a bridge

* Poor Blooming Infantry, or words to that effect.

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over the road, and some of the station buildings were hit. Thirty heavy bombs were dropped on the hostile aerodrome at Quéant; one shed was set on fire and another damaged; the railway station adjoining the aerodrome was also hit. The aerodrome at Ancoisne was attacked and two sheds hit.

A further attack by sixteen of our machines was made on the station sidings and dumps at Ledeghem; much damage was caused and three fires started; and in the course of the raid one of our escorting machines brought down a Fokker, which was seen to fall to earth in a field south of Poelcappelle.

A bombing raid by nine of our machines was carried out on the Zeppelin sheds at Brussels on August 2. No direct hits were observed on the sheds, though heavy bombs were seen to explode very close to them. Anti-aircraft gunfire was opened on our machines, which had descended to 1,000 feet to drop their bombs, but it was inaccurate. One hostile machine was seen, but it did not attack. All our machines met at their appointed rallying place after the raid, and all returned in safety, having picked up an escorting patrol on their return journey. The whole raid took five hours.

Another raid, composed of thirteen machines, was organised against Courtrai Station with a view to assisting the return of the Brussels raiders. Direct hits are reported to have been obtained as follows: Three on rolling-stock, two on buildings adjoining the station, four on the railway yard, and one on the main line. All machines returned safely. The anti-aircraft fire was very heavy during the attack, and a considerable number of hostile aircraft were engaged by the escort.

Again in the forenoon of August 3 were these operations repeated. Eight of our bombing machines, accompanied by an escort, left to attack the Ronet sidings at Namur and the airship sheds at Cognelee. Five of the machines reached their objective, and considerable damage in both cases was caused. A good deal of anti-aircraft fire was encountered when attacking the airship sheds.

A patrol machine sighted a hostile machine over Ypres, and in a ten minutes' fight fired twelve and a half drums of ammunition. The hostile aeroplane, driven down from 11,000 to 5,000 feet, plunged to earth.

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Four of our fighter aeroplanes encountered seven hostile machines on August 3, near Flers. In the fight which ensued, and which lasted for forty-five minutes, six of the enemy machines were driven down and the seventh broke off the fight.

The following day occurred that gallant infantry charge which swept on and beyond Pozières.

On the Road to Combles

By September 10 the British had made good the old German second position; the main objectives had been attained, and the Allied front was now in a symmetrical line, and everywhere on the highest ground. It must not be imagined, however, that a complete victory had been won. The attack on September 9 by the Irish regiments, which had helped to take Guillemont, though it carried Ginchy, made no progress in High Wood, was checked east of Delville, and, most important of all, did not succeed in carrying the work east of Ginchy called the Quadrilateral, all of which points at a later day were to prove a thorn in our side until demolished by the British aircraft.

The part played by aircraft in straightening the British line was mostly of an offensive nature. August was a month of innumerable raids and combats in the air—the necessary reconnaissance had been completed in the preliminary encounters of the early months—and the air war was far more intense and disastrous than in any one month since hostilities began. No fewer than 189 aeroplanes were reported in the British, French, and German *communiqués* as having been shot or driven down, destroyed, or put out of action, or forced to land. The German flying service suffered the most heavily. The British airmen claimed 33 enemy machines, and the French 88, during one month. At the same time, British Headquarters acknowledged the loss of 21 machines, either in air fights or by enemy gunfire; while five others, overtaken by a storm, failed to return.

The first incident of note in the month's fighting occurred on the 2nd. The heat was now very great, and a maddening haze still muffled the landscape. We were aware that the enemy was strengthening his position and bringing up new troops and batteries, but could not tell exactly where. At last, however,

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word was received that further German reinforcements were being rushed up by train along the Marcoing-Bapaume and the Marcoing-Roisel railways. Marcoing at this period was the strategic base of the enemy's Somme line. By road or by rail, this small, but important, junction south-west of Cambrai was in direct communication with every point in the German front line from Grandecourt to Berny and St. Christ; eastward by way of Cambrai three direct rail routes were available into Germany. It was decided by the British Staff that Marcoing must be put out of operation as soon as possible. The event was synonymous with an unusually stirring event of the air war.

"I turned round and almost ran into an L.V.G.," said the British aviator who was returning from the aerial bombardment of Marcoing. "I fired a drum at him, and he passed underneath me. I saw one of our machines engage him, and, while changing drums, I was attacked in front by a Roland. I fired a drum at this machine, and hearing a machine-gun behind me, looked round and saw three Rolands on my tail. I was hit in the leg almost immediately, but managed to give the hostile machines a drum from my side gun, on which they went away. My engine started spluttering, and I saw a hole in my petrol tank. My engine then stopped, and I then started gliding down, thinking I should have to land. The petrol was flowing over my left leg, but I managed to put my left knee over the hole in the petrol tank. It occurred to me that by pumping I might be able to get a little pressure. When I was only 200 feet up my engine started. I was then about fifteen miles from my lines. I kept pumping hard, and had just enough engine to keep going, though I thought I should have to land three or four times. Once I had actually flattened out to land when the engine just picked up in time, and I managed to cover the fifteen miles to the lines at an average height of only 50 feet. I had lost myself, and was so low that I could see very little of the country. So, seeing a French biplane flying low, I followed it and eventually landed, crashing the machine in doing so. I was feeling very weak, as I had lost a lot of blood, and was exhausted by having to pump for so long. During the time I was flying so low I was subjected to a lot of rifle and machine-gun fire."

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There followed beautifully clear autumn days, though the mornings were hazy and the visibility conditions poor until the sun had dispelled the mist. Then our airmen had their chance—and took advantage of it, paving the way for the third and most strenuous phase of the Somme battle.

Considerable co-operation with the artillery was carried out on August 5, and several enemy gun emplacements were destroyed. On Tuesday, September 8, largely owing to this aerial success, the British right, attacking at 4.20 A.M., in conjunction with the French, closed further in on Guillemont. An enemy squadron of ten aeroplanes the same day endeavoured to cross our lines on a bombing expedition, but were cut off by one of our offensive patrols of four machines. The enemy planes scattered and returned precipitately, pursued by our patrols, two of them having to make forced descents behind their own lines. Seven of our machines, again, on Saturday, August 12, as, after preparatory reconnaissances, the French attacked the third line north of the river (from the east of Hardecourt to opposite Buscourt, carried out a successful bombing raid on the railway and factories at Blanc Misseron, east of Valenciennes.

The British infantry were still advancing steadily on the left, pushing our line to the very edge of what was once Mouquet Farm, as well as to the north-east of it, and closing in to within 1,000 yards of Thiépval. In the clear weather our aircraft fought many battles. There were no British losses in aircraft, but four enemy aeroplanes were destroyed and many others driven to the ground in a damaged condition. In one instance three of our machines tackled a party of five enemy aeroplanes well behind the German lines beyond Thiépval. As soon as we attacked, two of the German airmen went down. The other three stayed and fought until one was sent crashing to the earth, when the other two also dropped to safety. For the first time the aeroplanes joined in with the infantry attack, and, flying low, used their machine-guns on the enemy's troops.

This new, and, in fact, the general development of the air force, was not without its effect on the enemy *morale*; passages from the letters and diaries of German prisoners testified to the audacity of our airmen and the terror with which the enemy regarded them. One corps report described our air work as

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"surprisingly bold." The Germans appeared to have acquired a complete contempt for their own air service. It was a stock joke amongst the rank and file that if an officer wanted to get fat he joined the Flying Corps, the officers of which did nothing but go and sit in the theatre at Lille with their breasts all covered with medals. The bitterness on the subject among the German troops was unanimous, and was an extraordinary testimony to the superiority of our own men in the battle.

CHAPTER III

THE SOMME BATTLE—THIRD STAGE

Aircraft Preparations for the Battle—The New Terror—September 15 and After—Daring Airmen in the Battle—The Tank and the Aircraft—The Beginning of the End—The Last Stage of the Battle—The Greatest Air Battle of the Year—Haig's Praise for the Work of the R.F.C.

WHEN the French headquarters, on October 3, 1916, said: "Our British Allies are not in the habit of mentioning, as we are, the names of airmen who, like Guynemer, Nungesser, and Navarre, add without ceasing new Boche machines to the total of casualties. They exist, however, and they have to their credit some superb records," they were paying us as delicate a compliment as only Frenchmen could. But they did more than that. What the secretive British Headquarters withheld from an anxious nation was revealed by our gallant Allies in a wealth of glorious detail.

We are introduced for the first time, for instance, to the first British "ace," the doughty Albert Ball: "One pilot, Captain Albert Ball, twenty years of age, has brought down 29 German aeroplanes and one Drachen." Comparison is offered—the highest form of flattery from the point of view of the French—with their own noted air champion. "Like Nungesser," the report continues, "he destroyed three machines in one single morning."

In a few terse, but graphic, sentences is summed up the full force of the British aerial effort from the early days of the great Somme battle until the time of the great raid on Libercourt. "Without, however, stopping to consider the individual valour," this semi-official report goes on to say, "let us look at the figures of the British army since July 12. During the month of July 46 German aeroplanes were brought down; 16 were damaged

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and disabled, I was brought down by anti-aircraft batteries. During August 18 Germans were destroyed, 38 were brought down more or less damaged, and 1 was brought down by gunfire. September was still more brilliant. Up to the 27th, 50 enemy machines were brought down, 60 were hit under very difficult conditions, 1 was a victim of anti-aircraft fire, and 6 Drachens were burnt, making a total of 123 machines destroyed and 114 suffering a more or less disastrous fate. All this occurred in the space of twelve weeks' fight. British raiders have not shown themselves less active, for they have dropped thousands of tons of bombs every day on German territory or on land occupied by the Germans.

"The attack on Libercourt on September 25 deserves special mention, for it was conducted with much skill and audacity. The object was to interrupt traffic on the railway from Lille to Douai. Trains were running south, carrying reserves of munitions for the battle of the Somme, and it was decided to attack them. Patrols were first of all sent over the aerodromes in order to hold in check the German airmen who had been able to interfere with the British pilots entrusted with the attack. Bombs emitting strong fumes and explosive shells were thrown on the enemy aviation grounds, where great excitement soon prevailed. While this was going on, attacking squadrons, with other aeroplanes in attendance, crossed the sky, waiting for the opportune moment. The first train was seen to leave Libercourt at 1.40 P.M. The second train was arriving on the line between Henin-Lietard and Ostricourt, where it joins the main line. Captain C and his machine gunner, Sergeant J, descended to about 250 metres (about 800 feet) over the first train, near Ostricourt, and successfully dropped six bombs. The engine was hit and jumped the rails. Three coaches were telescoped, and the maddened German soldiers got out of the carriages, looked for a way of escape towards Ostricourt, and in the direction of a wood near by. But Captain C went still lower, fired on the disorganised crowd, leaving numerous dead and wounded on the ground. The second train then arrived, but the first blocked the junction. Lieutenant W. and his gunner carried out a manœuvre similar to that of Captain C. Three bombs fell right on to the train. The German troops were panic-

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stricken, and tried to flee across the fields; but, followed by machine-gun fire, they had a difficult task. No fewer than 100 were killed or wounded in the two trains.

"Attacking aeroplanes went to the station at Libercourt, on which they dropped fourteen bombs. The buildings were blown up and the railway destroyed. Several overturned wagons obstructed the way in certain parts. Held in check everywhere by advance patrols, German aeroplanes did not appear. At one point one of these patrols destroyed an air shed, while another, operating over Phalempin, caused a large fire, probably in a petrol store. All the British machines returned safely, after having put an enemy aeroplane to flight which had ventured to approach the scene of their exploits."

Aircraft Preparations for the Battle

It was praise well merited. These and other events served to make September, 1916, one of the most memorable months of the war in the air. About this time was initiated that new and invaluable co-operation between aircraft and infantry in advance, the airmen swooping down to within a few hundred feet of the enemy trenches and riddling them with their machine-guns; while hand in hand with "contact" patrol, as it was called, there developed the new "Machine Gun Corps, Heavy Section," an alliance that was to prove more deadly and alarming to the enemy than any other British assault of the war. That day of Friday, September 15, the Germans set eyes on the Terror for the first time. They had, strangely enough, been warned of a new weapon, but what mortal weapon was this horror that walked by day? Ere they could collect their scattered wits, the bayonets of the British infantry, who had charged across the parapet following a hurricane bombardment, were upon them.

It was the crowning effort of as brilliant and painstaking a preparatory piece of staff work as the war had yet revealed. Everyone acquainted with trench warfare knows what was the root difficulty up to the date of the Somme advance. It had been quite rightly assumed that the attacking troops must only advance under a protective curtain of shells. On the other hand, as all the wires were cut as soon as the battle began, it was

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impossible to make sure that the moving curtain of shells would precede the attacking infantry without going too fast, or—what was a more ominous danger—too slow. The difficulty seemed so insuperable that some of the best artillery officers suggested that the only way out was to time exactly beforehand the movements of the attacking troops with the lengthening of the range. Any advance under such a system would have had to proceed according to a sort of time-table.

Fortunately, another solution was found, since the Allies had achieved the mastery of the air. The connection between the advancing infantry and the artillery was now ensured by the so-called infantry aeroplanes. Each French division was already provided with a number of these craft. Their task was to follow closely the advancing line, not in order to fire on the enemy, but simply to report to the gunners and let them know exactly what was going on. As soon as the infantry had reached a given point, the 75's were informed that they must lengthen their range beyond it, so as not to hit our own troops. Information was similarly given if the infantry happened to be held up by any unsuspected obstacle, or if a German counter-attack was seen coming up from the rear.

The New Terror

The way in which the new device was worked on the Somme was simply marvellous. It was mainly to this scientific system that the infantry owed the fact that they had been able to advance under a curtain of shells which moved continuously ahead of them at a distance of 200 or 300 yards. Still the nature of the work of the airmen varied. Their other important job was spotting enemy gun positions and other things so that our own guns could get on to them. On one day 132 targets were thus "dealt with." On another day our men went bombing an aerodrome, and they saw the enemy wheeling all the machines out of their sheds—which they knew would be bombed—so our men dropped a little lower and bombed the machines in the open. Another time they went for a factory, and a big explosion occurred. Then it was a railway station which was hit in several places. Or they came down and used their machine-guns on the German soldier workers massed about

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a pithead, or on the enemy's support lines, or the second line hostile trenches south of Beaumont Hamel. And then came that first wonderful message flashed to earth by an airman's wireless set:

"A tank is walking up the High Street of Flers with the British Army cheering behind."

The tank hung out a big piece of paper on which were the words: "Great Hun Defeat: Special!" as a low-flying aeroplane swooped down over its mammoth carcass, riddling with machine-gun bullets the panic-stricken Germans as they fled. The infantry attack on the left and centre was instantly successful. The Canadians, after beating off the German counter-attack, carried Courcellette in the afternoon, while the aircraft proceeded to even greater achievements.

September and After

The following day there was considerable co-operation with the artillery. On our army front seventy hostile batteries were engaged and 159 active batteries were located, twenty-nine of which were silenced; thirteen direct hits being observed.

In a successful bombing raid carried out on Bapaume Station thirty-eight bombs were dropped from heights varying from 200 to 800 feet. One train, several trucks and the station buildings were repeatedly hit, and the railway line was badly damaged. At Velu Station three trains were hit, several coaches derailed and a large store by the side of the line set on fire. Six bombs were also dropped on a neighbouring aerodrome. During the raid on Bapaume Station the escort protecting the bombers accounted for four German machines which were seen to fall to earth.

On the same day another bombing party attacked trains in the vicinity of Cambrai; one bomb, dropped from a height of 500 feet, exploded and blew up an ammunition train, a previous bomb having hit the engine. Another bomb was dropped in the midst of a mass of troops who got out of the train. A truck of another train was also hit. In the course of this raid some of our pilots attacked transport which was alongside the train with machine-gun fire. Damage was also done to trains at several other stations, and troops and trans-

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port on the road leading to Le Transloy were attacked with success.

Two of our pilots, while on an offensive patrol, encountered seventeen hostile aeroplanes at varying heights. They dived into the middle of the hostile formation and attacked. One pilot got to very close quarters with a hostile machine, which burst into flames and was seen to plunge to earth. He then attacked a second machine, which was driven down and fell in a field. A third machine went down vertically and was seen to crash.

Second-Lieutenant "A," whilst on patrol, observing infantry on the road, dived down to 200 feet, attacked with his machine-gun, firing about 100 rounds and causing great panic and many casualties. He was subjected to very heavy rifle fire. On many other occasions German infantry were engaged with machine-gun fire from aeroplanes, and one battery was temporarily silenced.

Daring Airmen in the Battle

In an ensuing week, on the afternoon of Sunday, the 17th, south of the Somme, the French right wing carried the remainder of Vermandovillers and Berny, and the intervening ground around Deniecourt. The following day Deniecourt, with its strongly fortified park, was captured. For the next week there was a lull in the main operations while the British airmen again prepared the way for a further advance.

On September 21, to quote a single instance, while, as every available R.F.C. record for this period has mysteriously disappeared, we must persist in calling this unknown hero Lieutenant B, having dispersed a formation of six Rolands, got underneath the nearest machine and emptied a drum of ammunition into it. The enemy went down apparently under control. Lieutenant B then attacked another machine from underneath and fired two drums into the pilot's seat. The hostile machine was seen to plunge to earth. Later in the evening Lieutenant B destroyed another machine.

Another, Second-Lieutenant C, attacked and brought down a hostile kite balloon. At 3,000 feet, when over Comines, he dived on the balloon, which was then rapidly descending. He

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opened fire at 400 yards and finished his drum as he passed about twenty feet over the balloon, which had by that time caught fire.

On September 22 a bombing raid was carried out on Somain Station. An ammunition train was blown up, and the rolling-stock, permanent way, station, and sheds were very much damaged.

There was considerable co-operation with the artillery for the next few days, and on September 23 the British guns obtained four direct hits on gun-pits and two on an anti-aircraft battery, both of which caused explosions. Two hits were obtained by siege artillery on a hostile battery. Trenches were damaged and some lorries west of Vimy were hit. Second-Lieutenant D and Corporal E (two more mystery men) attacked a hostile machine near Sailly Saillisel. The German was driven down, and appeared to be out of control. Later, when near Morval, they attacked two hostile machines, one of which succeeded in getting in position in rear of our machine. Lieutenant D stalled the machines, and the observer stood up to use the rear gun, but he had barely pulled the gun into position when he was hit in the head and killed. The gun fell down, as the stand had not been clipped into position, and struck the pilot on the head. The pilot remembered nothing distinctly until he recovered consciousness on the way to a French Army Headquarters.

A Captain F engaged two hostile machines over Warlencourt. He emptied a drum into one of them at a range of five yards. The German machine fell to earth.

In a bombing raid 132 bombs were dropped on Fresnoy, Lens, and Lille Stations, and considerable damage was done. Douai Railway Station was also attacked. A fire and explosion were caused at Roisel Station. Bapaume Station was also attacked and considerably damaged.

Three further bombing raids were carried out by night.

At about 6 p.m. Lieutenant G engaged four two-seater Rolands. Approaching from behind he scattered his opponents by firing one drum at them. He then got underneath the nearest machine, into which he fired 90 rounds. The machine caught fire, and was seen to plunge to earth.

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Lieutenant H, while on an offensive patrol, attacked a Fokker. The German machine was destroyed.

Fifty-two bombs were dropped on Seclin Railway Station, setting fire to the main station building and hitting the railway bridge.

The Tank and the Aircraft

The hour of the big British attack on September 25 was fixed for thirty-five minutes after noon. As has already been said, the general scheme, which was planned to intercept the German traffic on the Douai-Lille main railway line, was carried out by the aircraft. The railway station at Libercourt, sidings, and rolling-stock were to be bombed, and an attempt made to attack trains going south in the hope that they might be carrying troops or ammunition towards the Somme battlefield. Patrols, each of three aeroplanes, were first sent to attack neighbouring enemy aerodromes to prevent German aeroplanes from going up to interfere; smoke bombs were dropped at intervals to keep the aeroplanes enveloped in smoke, and from time to time a high explosive bomb to show that our machines were still there. During this period two of our machines were to descend and attack the trains. Everything was carried out almost with the precision of a railway time-table. The moment the first train was seen to leave Libercourt one of our machines dived down to attack it; six bombs were dropped from a height of about 800 feet. The engine was hit, became derailed, and two or three of the front coaches partly telescoped, while German soldiers who immediately began to alight, were fired on, and ran towards Ostricourt village and woods.

On September 26, according to Sir Douglas Haig, "Luedecourt was carried, after the protecting trench to the west had been captured in a somewhat interesting fashion. In the early morning a tank started down a portion of the trench held by the enemy from the north-west, firing its machine-guns and followed by bombers. The enemy could not escape, as we held the trench at the southern end. At the same time an aeroplane flew down the length of the trench, also firing a machine-gun at the enemy holding it. These then waved white handker-

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chiefs in token of surrender, and when this was reported by the aeroplane the infantry accepted the surrender of this garrison. By 8.30 a.m. the whole trench had been cleared, great numbers of the enemy had been killed, and eight officers and 362 other ranks made prisoners. Our total casualties amounted to five."

In October, preparatory to the fourth and closing stage of the Great Battle, there was a general slackening up on the part of all branches of the fighting services. There were but few events of major importance, though some progress was made. On October 1 the British infantry advanced on a front of 3,000 yards, taking the Flers line north of Destremont, while a London Territorial division—the same which had taken High Wood—occupied the buildings of the old abbey of Eaucourt, less than a mile south-west of Le Sars village. It was not until the afternoon of October 6, however, that we eventually cleared the place. From that date for a month on we struggled up the slopes, gaining ground, but never winning the crests. On November 9 the long continued bad weather took a turn for the better, and thereafter remained dry and cold, with frosty nights and misty mornings, for some days. Final preparations were therefore pushed on for the attack on the Ancre, though, as the ground was still very bad in places, it was necessary to limit the operations to what it would be reasonably possible to consolidate and hold under the existing conditions.

The Beginning of the End

In the October air fighting the number of aeroplanes destroyed or damaged on the Western Front was considerably less than in September, when the total claimed by the British, French, and Germans was well over 300. British Headquarters, in October, admitted the loss of forty-two machines, and claimed sixteen German aeroplanes destroyed and more than twenty-three others shot or driven down damaged. The French claimed fifty-one brought down and fourteen others forced to land. On the German side sixty-two Allied machines were claimed plus five defeated. On October 23 it was stated that "twenty-two enemy airmen were shot down in air fights and by

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anti-aircraft fire; eleven are lying behind our lines." This was the day of a desperate counter-attack on the part of the enemy. The Germans succeeded, indeed, on the evening of the 23rd in regaining a portion of the ground east of Le Sars taken from the enemy by our attack on that day. On all other occasions about this period his attacks were broken by our artillery or infantry, and the losses incurred by him in these attempts, made frequently with considerable effectives, were undoubtedly very severe.

On the evening of September 30 one of our air patrols encountered many hostile machines. A formation of seven Rolands near Bapaume was dispersed, two of them being driven down out of control.

On October 1 Captain A drove down two patrolling-machines out of control near Gommecourt. He afterwards waited and attacked three hostile machines which came up from a neighbouring aerodrome; he forced one to land and dispersed the remainder.

Lieutenant B and Lieutenant C, when taking photographs, were attacked by seven Rolands. The attack was driven off with the assistance of two of our patrolling machines, who joined the fight. One of the Rolands fell in a nose-dive, and was seen to plunge to earth.

On October 10, Lieutenant D and Lieutenant E had six encounters between 7 and 8.45 a.m., whilst on artillery patrol. In an encounter with three L.V.G.'s one German machine dived, emitting clouds of smoke, having been engaged at a range of 20 yards. The remaining machines declined close combat.

Second-Lieutenant F, in the course of an encounter with several hostile machines, had all the controls of his machine, with the exception of the rudder, shot away. His machine turned a somersault and was wrecked; the pilot was unhurt.

A highly successful bombing raid was carried out against railway trains and stations at Quéant, Cambrai, and Bapaume at about 11 p.m. on the night of October 10. A train entering Cambrai was attacked and wrecked, a bomb being observed to hit the first carriage behind the engine. The second bomb hit

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the station buildings, whereupon all the lights were extinguished.

Second-Lieutenant G fired a drum of ammunition from 1,400 feet at a closed touring car. The car immediately stopped, and three people got out of it and ran away.

The Last Stage of the Battle

The better to understand the desperate aerial attacks on the part of enemy aviators in the closing months of the year, and particularly the great battle which took place on November 9, between seventy British and German machines, it will be well to study the general battle situation prior to the attack on the Schwaben Redoubt. The enemy's defences in this area were already extremely formidable when they resisted the British attack on July 1, and the succeeding period of four months had been spent in improving and adding to them in the light of the experience he had gained in the course of our attacks farther south. The hamlet of St. Pierre Divion and the villages of Beaucourt-sur-Ancre and Beaumont Hamel, like the rest of the villages forming part of the enemy's original front in this district, were evidently intended by him to form a permanent line of fortifications, while he developed his offensive elsewhere. Realising that his position in them had become a dangerous one, the enemy had multiplied the number of his guns covering this part of his line, and at the end of October introduced an additional division on his front between Grandcourt and Hebuterne.

The great air battle of the 9th preceded the infantry advance on the morning of November 11. This attack itself followed a special bombardment, which continued with great bursts of intensity until 5.45 a.m. on the morning of November 13, when it developed into a very effective barrage covering the assaulting infantry.

The Greatest Air Battle of the Year

The most graphic picture of the air battle between seventy machines, which took place on November 9, is that from the pen of the *Times* correspondent at British Headquarters, as follows:

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"The German airmen have grown bolder than for a long time past. Evidently they largely increased the number of their machines upon this front, and stung, doubtless, by the contempt into which their flying services had fallen even in the eyes of their own troops, they are making a more serious attempt to dispute the mastery with us than they have made this summer.

"That the Germans will continue to struggle desperately to regain some measure of the air supremacy—and of the self-respect—which they have lost, we must presume. The winter will probably see very bitter fighting, if not open battle on so grand a scale as that on November 9. But all air fighting now is much closer and more savage than it has ever been before. The importance of air mastery has been more clearly demonstrated and the individual fighting skill immensely increased. With the greater speed of machines and greater cleverness in handling, the old leisurely combats are no more, when two machines might fly side by side and empty successive drums of ammunition each at the other. It is now a headlong plunge and a single shot; a dip and a swerve and another shot; a loop and a glimpse, and a single shot again; a duel swifter, more breathless, and more reckless than any fighting ever was on earth or sea.

"In their own effort the Germans are copying our tactics exactly; and by 'ours,' I mean those of the French as well as ourselves, for the flying services of the two armies work in such perfect harmony that they are to all intents one single service. Some of the things which have given us our air supremacy are of British initiation and some French; but we practise and use them in common and share equally the glory.

"It is a long time since the German initiated anything in the air. Now, in his recrudescence of activity, he is doing his best to learn from us. He copies exactly our methods, formations, and air tactics. In the recent light nights especially, his airmen have been penetrating behind our lines, trying to bomb railheads and transport, and so forth; and individual Germans are even getting so bold as to do what we have done for the last four months, namely, fly low enough to use their machine-guns on the troops in the trenches or on columns on

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the road. So far they are making little by it, and they are having a most exciting time.

“One of the chief evidences of the new activity has been the great aerial battle, wherein some seventy aeroplanes are engaged, which the official communiqué has already mentioned. It took place between 9 and 10 o'clock on the morning of November 9, well over the German lines in the direction of Vaulx-Vraucourt, north-east of Bapaume, whither certain of our aeroplanes were bound on a bombing expedition. With them were fighting machines and scouts, making in all a fleet of thirty sail. Near the villa of Mory, just before reaching Vaulx-Vraucourt, they sighted an enemy squadron somewhat outnumbering themselves, the actual strength being something from thirty-six to forty aeroplanes.

“We attacked at once. Some of our machines were flying at a higher level than the enemy, and they plunged headlong to join in the general engagement, which was fought at an average height of not much above 5,000 feet. Of the mêlée which followed it is impossible to get any coherent account, for no man in it had time or thought for anything except the enemy machines with which he was successively engaged; but for twenty minutes there raged among the clouds such a battle as the world has never seen before; an inextricable tangle of single combats, of darting, swirling machines, the air filled with the roar of seventy propellers and the chatter of guns.

“Four of our machines were lost; that is to say, they were compelled to descend in German territory, a strong westerly wind drifting the battle as it raged more and more over the enemy's soil. In the ships which came home, one brought a dead observer, and two others, with wounded pilots, had difficulty in beating up against the wind and landing in our lines.

“Of the enemy we know that six machines were sent to earth, of which three are known to have crashed. What happened to the other three, beyond that they were falling out of control, is not known. In yet another the pilot was seen to be shot dead. What further casualties the enemy suffered he only is aware; but the best evidence that the victory was ours lies in the fact

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that the whole enemy formation was broken and scattered. The Germans fled for safety in all directions, leaving us in possession of the sky. Then we went on upon our business, we punctually dropped our bombs on the stores and ammunition depots of Vaulx-Vraucourt, and then came home proudly flying in regular formation, no German daring to interfere.

"It is, of course, one drawback to the splendid audacity with which we carry the fighting always into the enemy's country that we cannot count his dead. We know only how many of our own machines do not come home, and how many of the enemy's machines have visibly crumpled and fallen, obviously wrecked or in flames. In such a fight as this—in every fight where more than a single aeroplane is engaged on either side—a victorious combatant cannot stop to watch the adversary who goes to earth to see if he is really broken. Another opponent demands his instant attention; and of those birds which are winged and crippled, but can just limp home, or of those others which carry their shot for awhile and then fall dead, we learn nothing. And it is curious how large a part in this is played by the westerly wind which blows for three-quarters of the year. Even when an east wind does blow here, it is seldom flying weather; so practically every battle is fought in a wind against which no disabled machine of ours can beat home, while the enemy has always his own soil below him, and a wind in his favour.

"Taking this same day as an example, the official *communiqué* mentioned that in all seven of our machines were missing, including the four in this great battle. Of German machines we know that we drove down fifteen, including the six of this battle, 'in a damaged condition'; but how many others crawled home nursing wounds, or how many withdrew from the fighting in good order and then fell later, we have no way of telling. What we do know is that, continuing to run vastly greater risks than his men have yet learned to run, we daily inflict on the enemy heavier losses, counting those which are obviously alone, than we suffer."

The sum total and effect of the air fighting on this and the day following was that, by nightfall of November 13, the British infantry were established on the western outskirts of Beaucourt,

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in touch with our forces south of the river, and held a line along the station road from the Ancre towards Beaumont Hamel, where we occupied the village. Farther north the enemy's first line system, for a distance of about half a mile beyond Beaumont Hamel, was also in our hands. Still farther north—opposite Serre—the ground was so heavy that it became necessary to abandon the attack at an early stage, although, despite all difficulties, our troops had in places reached the enemy's trenches in the course of their assault.

Sir Douglas Haig Praises the R.F.C.

Next morning, at an early hour, the attack was renewed between Beaucourt and the top of the spur just north of Beaumont Hamel. The whole of Beaucourt was carried, and our line extended to the north-west along the Beaucourt road across the southern end of the Beaumont Hamel spur. The number of our prisoners steadily rose, and during this and the succeeding days our front was carried forward eastwards and northwards up the slopes of the Beaumont Hamel spur. The results of this attack were very satisfactory, especially as before its completion bad weather had again set in. The British had secured the command of the Ancre valley on both banks of the river at the point where it entered the enemy's lines, and, without great cost to ourselves, losses had been inflicted on the enemy which he himself admitted to be considerable. While of the part played by the Royal Flying Corps in these operations, Sir Douglas Haig reported, in the dispatch dated December 23, 1916, published as a supplement to the *London Gazette* on December 29, describing the battle of the Somme, as follows :

“The admirable work of this Corps has been a very satisfactory feature of the battle. Under the conditions of modern war the duties of the Air Service are many and varied. They include the regulation and control of artillery fire by indicating targets and observing and reporting the results of rounds; the taking of photographs of enemy trenches, strong points, and battery positions, and of the effect of bombardments; and the observation of the movements of the enemy behind his lines.

“The greatest skill and daring has been shown in the performance of all these duties, as well as in bombing expeditions.

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Our Air Service has also co-operated with our infantry in their assaults, signalling the position of our attacking troops, and turning machine-guns on to the enemy infantry and even on to his batteries in action.

"Not only has the work of the Royal Flying Corps to be carried out in all weathers and under constant fire from the ground, but fighting in the air has now become a normal procedure, in order to maintain the mastery over the enemy's Air Service. In these fights the greatest skill and determination have been shown, and great success has attended the efforts of the Royal Flying Corps. I desire to point out, however, that the maintenance of mastery in the air, which is essential, entails a constant and liberal supply of the most up-to-date machines, without which even the most skilful pilots cannot succeed."

Finally, it may be said that in aerial warfare during 1916 nearly 900 enemy aeroplanes were brought down, the French accounting for 450 and the British 250. Of eighty-one observation balloons brought down, forty-one fell to the French and twenty-seven to the British. In one year the Allies carried out at least 750 bombardments, of which France was responsible for 250 and Great Britain for 180, to which must be added 174 which took place in Macedonia.

CHAPTER IV

DEVELOPMENTS IN 1917

General Battle Situation—The Birth of the R.A.F.—The Second Air Board—The Air Council—Supply of Aircraft—General Brancker's Training Scheme—Central Flying School—The System in Operation.

THE activities of 1917, which was probably the busiest year of aerial operations, fall naturally into three distinct campaigns. Those of the Spring, Summer and Autumn. The Spring campaign reached a climax with the extensive British advance in the neighbourhood of Bapaume in March and April. The former months had proved a record for air fighting, but even that was eclipsed by the period of extensive bombing raids and desperate combat which ensued from the time of the British May attack in force, near Arras, up to the time of the raiding campaign against numerous Rhine towns during August. This was, in its turn, overshadowed by the last decisive effort on the part of the aviation services of every belligerent, commencing in September, and outrunning the winter's warfare far into the Spring of 1918.

Though January and February of 1917 proved barren of results, both Allied and Central Powers, unknown to the world, were straining every nerve in factory, laboratory and workshop alike, in preparation for the coming Summer campaign; and by the end of April, the concluding stage of the Spring campaign, the war in the air was in full swing. Aerial combat increased tremendously; on April 5 large formations of British aeroplanes destroyed 15 and drove down 31 German aeroplanes, as against a loss of 28; while between April 5 and 14 combined French and British raiding expeditions visited Danvillers and Spinecourt, where one French squadron alone made seven sorties; the railways of Spinecourt, again, wrecking

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three trains; and there was a reprisal raid on Freiburg for German attacks on hospital ships.

German aeroplanes, during the same period, dropped 9 bombs on Broadstairs on March 1; on the 16th 12 on Westgate; and a moonlight raid on Kent, April 5, two days later was succeeded by another on North London, where one person was killed and two others injured. Zeppelins also raided Kent on the night of March 16-17, causing trivial damage, and the enemy lost three more of their great airships before the end of April. On February 26 there was a trustworthy report that a Zeppelin had been wrecked over Ghent during her trials, her crew being killed. The L39 was brought down by French guns at Compiègne on March 17; while yet another craft, on the 31st of the same month, was brought down in flames at Odobesei, on the Roumanian front, and a brand-new Zeppelin was wrecked in trials during a storm at Friedrichshafen, April 23, her crew being killed. We lost an airship of the Coast Patrol (C.P.) type, and a crew of eight, in the Straits of Dover on April 1. A Russian raid, March 4, on Bardnovitchi, and an Italian on March 18 against Calliano station were the only other activities of lighter-than-air craft in this period. At sea the *Ben-ma-chree*, a British aeroplane mother-ship, was sunk by gunfire; British naval machines raided Bruges, February 2, 14 and 16, causing damage to six destroyers and considerable damage to the railway, while Pola shipyard and arsenal was bombed by Italian seaplanes on March 17; the Bosphorus forts by Russian seaplanes on the 5th; and 5 German destroyers were attacked by British seaplanes on April 23, one enemy destroyer believed to have been sunk.

In the Balkans British naval planes carried out two important raids—January 4, severely damaging the Kuleli-Burgas bridge, and blowing up a munitions factory near Demir Hissar on February 11. Our aviators were equally active in the Near East, a noteworthy incident occurring (March 25) in Palestine, where four British airmen dispersed 3,000 infantry and 2,800 cavalry, after previously having bombed Shillah with excellent results. British bombs destroyed a munitions establishment in the Citadel of Bagdad on January 20, in the Mesopotamian campaign, and aeroplanes co-operated in the re-

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capture of Kut. In France during February the Départments of the French Air Services were amalgamated under General Guillemin, Director-General of Aeronautics at home and in the field, M. Thomas remaining in control of manufacture and supply. At the same time, aeronautical events in America were shaping towards an inevitable conclusion. The Pan-American Aeronautic Exposition, held at Grand Central Palace, New York, during the week February 8-15, was nothing more nor less than a trial of strength for war. Three days previous to the Exposition, February 5, three most significant events had occurred. In a day Congress voted the Army £2,000,000 (\$10,000,000) for anti-aircraft and ammunition; the General Board of the Navy recommended appropriation of \$6,000,000 for Navy aeronautics for 1918; while the Signal Corps contracted ahead for 260 aeroplanes and 90 seaplanes, though the previous year (1916) the U.S.A. had ordered only 71 machines and 4 kite-balloons. The following month Lieutenant-General George Squier was appointed Chief Signal Officer, with rank of Brigadier-General for four years from February 14, succeeding General Scriven; and in April the United States came into the war.

The Dramatic Spring of 1917

In the rush of world-moving events which succeeded each other with such rapidity during this dramatic Spring of 1917, sight must not be lost of the British aerial effort on the Western Front during March, when we alone bore the burden of the fiercest four weeks of aerial activity which had occurred so far in the war. Only once had the monthly losses, since the beginning of the Battle of the Somme, exceeded those which were officially recorded for March. Little notice, however, can be taken at this place in our history of this minor matter, when so many major issues yet were at stake.

A strident challenge to the efficiency of the British naval aviators had been issued with Germany's announced intention, January 31, to begin unrestricted warfare by submarines, by which all ships making for Allied ports were to be sunk on sight, including British hospital ships. The number of British anti-aircraft patrols, both seaplane and airship, was immedi-

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ately increased fifty per cent. Orders were given for more aircraft on all hands, not alone for sea air-warfare, but, taking advantage of the brief lull, a number of inventions, a greater number of experiments, and countless new and more speedy aircraft were completed and tested in January and February, though they were held back from active service until the end of March. They were then flown from Farnborough, across the Channel, to make good the heavy British losses in the desperate air fighting of that month. At the same time, opportunity was taken to effect a very necessary reorganisation of the flying services.

Meanwhile, like hammer blows, great events in the international situation were falling one on top of the other. There was a pretty general feeling that the war was now embarked on its last and most vital phase. The issue still hung delicately in the balance; the belligerent Powers were straining every nerve toward the ultimate victory. Then, on February 3, to the great surprise and consternation of the enemy, President Wilson broke off diplomatic relations with Germany. Cheered by this event the worn, tried veterans of the Allied armies swept into the battle again with all the fervour and irresistible energy of newly-joined recruits. Just over a month later the Russian Revolution broke loose.

The year 1917 saw the realisation of the greatest development in British aviation of the war—the passing of the Air Force (Constitution) Act, 1917, and the amalgamation of the Royal Flying Corps and the Royal Naval Air Service in a unified Air Force.

The Birth of the R.A.F.

It will be necessary to recapitulate certain events in the history of these two services before and in the early stages of the war for the reader properly to understand the new situation. The Royal Flying Corps, which came into existence in May, 1912, originally was intended to be a joint service divided into naval and military wings, which would be administered by the Admiralty and War Office respectively; the R.N.A.S. becoming a separate service as a branch of the Navy in July, 1914. With a view to ensuring co-operation between the two

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branches, a Joint Air Committee was formed of naval and military representatives under the chairmanship of Colonel Seely, the then Under-Secretary of State for War. Apart, however, from the Central Flying School, there was no establishment common to the use of the two wings, and, at the outset, the forces working in the direction of dualism proved stronger than any unifying influence which the Joint Air Committee was able to exert. Aeronautics, it must be remembered, were in a comparatively primitive state of development, air operations, as then practicable, were strictly ancillary to naval and military operations. The two branches of the air service thus tended to reflect the essential differences in organisation and outlook which must exist between services so different in functions and methods as the Navy and Army.

The outbreak of war necessitated the rapid expansion of both branches, and competition between the services ensued to some extent in personnel, but chiefly for supply of material. The absence of any independent and competent method of allocation, between the two services, of aeronautical resources and of such material as could be obtained from our Allies, produced inconveniences which the ever-growing needs of both the naval and military branches tended to aggravate.

In an endeavour to find a solution to these difficulties, the Cabinet in February, 1916, appointed a new Air Committee under the chairmanship of Lord Derby. This Committee, though it accomplished useful work, had no independent advisers. It could suggest and recommend, but if its recommendations fell on unwilling ears it had no powers of enforcing them. The Derby Committee, as it was known, terminated after two months with the resignations of Lord Derby and Lord Montagu.

Then followed a decidedly more definite step in the direction of co-ordination. The appointment of the first Air Board in May, 1916, under the presidency of Lord Curzon. On this Board the Army Council and the Board of Admiralty were directly represented in the persons of Sir David Henderson (then Director-General of Military Aeronautics) and Rear-Admiral F. C. Tudor, then Third Sea Lord. The Air Board was empowered to discuss matters of policy in rela-

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tion to the air, to make recommendations to the Admiralty and War Office, and, in the event of those Departments declining to act on its recommendations, to refer the matter to the War Committee. It was further announced, in the House of Lords, by Lord Curzon that the Board would review among other questions the possibility (which had been mooted at the time of the appointment of the Derby Committee) of the amalgamation of the supply and design branches of the two services, as well as "in the further background the desirability or possibility at a future date of creating a single Department under a single Minister."

The Second Air Board

The formation of the second Air Board under the New Ministries and Secretaries Act, 1916, marked the second stage, following upon a report by Lord Curzon to the War Committee, in which a considerable extension of the powers of the Board was recommended. Says the War Cabinet Report for the year 1917: "Lord Curzon had retired from the Presidency upon his becoming a member of the War Cabinet under the Premiership of Mr. Lloyd George, and he was succeeded in January, 1917, by Lord Cowdray. A month later the Air Board was able to submit for the approval of the War Cabinet a draft of the Charter defining its functions and duties, which the Board, after discussion, had settled with the Admiralty and War Office. The Director of Naval Air Services was given a seat on the Board of Admiralty as Fifth Sea Lord, and the supply of all heavier-than-air craft, together with their engines and accessories for both services, was transferred to the Ministry of Munitions, the Air Board becoming responsible for design and for the allocation of the aircraft between the two services in accordance with the aerial policies determined by the services in concert with the Air Board. Two members of the Ministry of Munitions, the Controller of Aeronautical Supplies and the Controller of Petrol Engines were added to the Board. In February the Departments of the Controller of Aeronautical Supplies, of the Director-General of Military Aeronautics, and of the Director of Naval Air Services were transferred to the Air Board Office. The various authorities concerned with

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aviation were thus for the first time housed under one roof. Such an arrangement (though subsequent developments have led to the occupation of other adjacent buildings) was clearly of a nature to facilitate the amalgamation not only of the departments of design and supply, but also of the combatant services themselves if events proved such a measure to be desirable.

"It is now necessary to discuss the factors which led to the transformation of the second Air Board into the fully equipped and independent Ministry which is, at the date of the Report, in course of organisation. At the time of the formation of the second Air Board, the requirements of the two services in the matter of aircraft were far from satisfied, and during the first six months of its existence the whole of its energies were devoted to increasing supply in order to meet those requirements.

"By the middle of the summer of 1917 the situation had improved so much that the Board was in a position not only to look forward to the day when the needs of the two services would have been met, but also to anticipate the creation of a substantial surplus of aircraft beyond those needs. It then became necessary to take measures for the utilisation in the most effective manner of these additional aircraft. This gave rise to questions of policy which the Board, constituted as it was, was unable to solve. An Air War Staff became a necessity in order to consider problems of aerial offensive and defensive distinct from those connected with the operations of the army and the navy. The need for such a body was pointed to by the obviously increasing importance of these problems. The speed, range and carrying capacity of aircraft were reaching a stage of development almost unsuspected at the beginning of the War. It was possible to envisage from the results of bombing operations already practised on lines of communication and other places behind the enemy's lines the effect which the extension of these operations might have upon the determination of a struggle which, as regards the conflicts of the opposing armies on the Western Front, threatened to reach, if not a deadlock, at all events a condition where victory might only ensue by a long and costly process of attrition.

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"From the point of view of defence, the new arm presented problems pregnant with at least equal importance. The proud and ancient inviolability of these islands was being challenged in a new and startling fashion, and the seriousness of the problem was added to by the fact that the geographical position of the capital of the Empire rendered it particularly inviting to attack from the air. The menace of the lighter-than-air craft seemed in a fair way to be overcome, but it was clear that the possibilities of attack by bomb-carrying aeroplanes were not yet either measured or mastered, and any arguments based on the assumption that the uses of aircraft were purely ancillary to military or naval operations were being refuted by the logic of fact and experience. The Air Board, however, possessed neither the staff nor organisation to enable it to cope with these problems. The President was without that body of technical advice which alone would enable him to form a correct judgment as to the relative importance of the different methods of employing aircraft. For technical advice of this kind he could look only to the naval and military members of the Board who sat there mainly as representatives of the Board of Admiralty and of the Army Council."

General Smuts and the Air Board

This situation led to Lord Cowdray's addressing, on July 28, 1917, to General Smuts (as the member of the War Cabinet charged with the general supervision of air matters) a letter, setting forth his view that the Air Board should be turned into a permanent Ministry, that it should have a War Staff to consider the best use to be made of aircraft not needed directly by the operations of the navy and the army, and that the surplus aircraft should be considered a distinct unit from the air contingent attached to the Expeditionary Force.

At last, on August 24, the War Cabinet decided on the establishment of an Air Ministry, while a further committee, under the chairmanship of General Smuts, composed of representatives of the Admiralty, War Office, Treasury and Air Board, and known as the Air Organisation Committee, was ordered to meet at once to work out a scheme for giving effect to this decision. To this Committee fell the task of carefully

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plotting out the ground before any legislative action was initiated. Its inquiries fell naturally under the following leading questions: (1) the legislation needed for the establishment of an Air Force and of an Air Council to administer it; (2) the constitution of the Council, its membership and the appointment of duties between the members; (3) the organisation of the Air Ministry, and the duties of its officials; (4) the question of supply in all branches, the rates of pay, conditions of service and pensions allowance, the relation between the Air Ministry and Air Force and Regulations, and other matters relating to discipline, etc. On the majority of these questions the Air Organisation Committee was able to arrive at an agreement with the departments concerned.

The Air Council

The Air Force Bill, following the discussions of the Committee, was introduced into the House of Commons in November, receiving no opposition. The Royal Assent was given on the 29th of that month. A readjustment of the positions of the Technical Department of the Air Board, which was responsible for the design of aircraft, and the Aeronautical Supply Department, under the Ministry of Munitions, which was under the charge of Sir William Weir, who was also a member of the Air Board, was one of the first steps undertaken towards reorganisation. The functions of the two Departments were thus unified, and the next step was to set up the Air Council and to define the duties of its members. This was done, according to the War Cabinet Report, by Orders in Council issued on December 21, 1917, and January 2, 1918. On the latter date Lord Rothermere (who had been appointed President of the Air Board on November 23, following Lord Cowdray's resignation) was appointed Secretary of State. The appointments of the other members of the Air Council were announced at the same time: Lieutenant-General Sir David Henderson, K.C.B. (additional member and Vice-President); Major-General Sir Hugh Trenchard, K.C.B. (Chief of the Air Staff); Commodore Godfrey Paine, C.B. (Master-General of Personnel); Major-General W. S. Brancker (Comptroller-General of Equipment); Sir William Weir (Director-General

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of Aircraft Production in the Ministry of Munitions); Sir John Hunter, K.B.E. (Administrator of Works and Buildings); and Major J. L. Baird, C.M.G., D.S.O., M.P. (Parliamentary Under-Secretary of State).

The new Air Ministry was faced immediately with a number of widely divergent problems, as the training of a strong reserve of personnel—to make good the heavy losses occasioned by the severe air fighting on the Western Front—the supply of aircraft, the full consideration of the possibilities of after-the-war commercial aircraft, medical research and aviation inventions, and the seat of responsibility for the control of lighter-than-air craft, and home defence against air raids. The latter was now put under the control of the Field-Marshal commanding the Home Forces, the Air Council being in no way responsible. Aircraft, anti-aircraft guns and searchlights for the defence of London were united under the immediate command of a single General Officer—Major-General Ashmore. Elsewhere in the United Kingdom the guns and lights were under the local General Officer Commanding-in-Chief, while the aircraft were grouped under the General Officer Commanding a Brigade, and units of the naval or military forces engaged in defence against aircraft by arrangement with the Admiralty or Army Council were attached to the Air Force. The latter units included, particularly, seaplanes, airships, and, to a lesser extent, kite-balloons.

The arrangements for dealing with aeronautical inventions were divided between the Board of Inventions and Research under the Admiralty, the Munitions Inventions Department under the Ministry of Munitions, and the Directorate of Military Aeronautics under the War Office. In this case, co-ordination of all sources of knowledge and experiment was of prime importance, and one of the duties with which the first Air Board was charged was the organisation of a system of further interchange of ideas on air problems between the two services. A settlement of the problem, however, was not reached until the middle of 1917, when an Air Inventions Committee was appointed by Lord Cowdray, to which was transferred all duties in connection with the examination of inventions relating to heavier-than-air craft. This Committee

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now worked in the closest co-operation with the Advisory Committee on Aeronautics.

Medical research, though it was not generally known, played an important part in the development of the new British Air Force. A Medical Research Committee appointed in March, 1917, performed valuable services to the investigation of the various physiological phenomena produced by flying at high altitudes and kindred subjects. It was found by experience that flying men were subject to many peculiar disabilities, and considerable progress was made in the methods of prevention and cure of these disabilities. The long-sighted policy of the new Ministry may be seen in the appointment, in April, 1917, under the chairmanship of Lord (now Viscount) Northcliffe, of the Civil Aerial Transport Committee.

This Committee at the outset considered the problem of commercial aviation on a broad basis, under two main divisions, while dividing its inquiry into five branches, each entrusted to a special committee, as follows:

- (1) Questions of law and policy.
- (2) Technical questions as to the performance of aircraft and the requirements of aerial services.
- (3) Business questions relating to the position of the aircraft manufacturing industry after the war.
- (4) Labour questions.
- (5) Problems of research and education.

The main deliberations turned on:

- (1) "The steps which should be taken with a view to the development and regulation, after the war, of aviation for civil and commercial purposes, from a domestic, an Imperial, and an international standpoint.
- (2) "The extent to which it will be possible to utilise for the above purposes the trained personnel and the aircraft which the conclusion of peace may leave surplus to the requirements of the naval and military air services of the United Kingdom and Overseas Dominions."

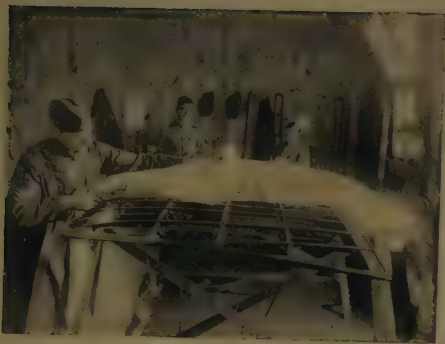
Principally, however, the Air Ministry was concerned with

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the creation of the highly necessary reserve of trained personnel and the supply of aircraft. The expansion of the Air Services was keeping pace generally with the growing needs of the Navy and the Army—needs which may be summed up—in fact, have been noted already in a previous volume—in the brilliant part played by the Royal Flying Corps and the Royal Naval Air Service in the battles of the Somme, Vimy, Messines and Ypres, to which brilliance frequent testimony was borne by the Commander-in-Chief, as to the inestimable value of the work performed daily and nightly by the two air services. It is only fair to state that not even this well-known superiority of British over enemy aviators would have enabled them to have earned Sir Douglas Haig's praise in so unstinted a measure unless they had been supplied with satisfactory machines and equipment from home. Not only were the technical difficulties and the resultant research and experimental work of this comprehensive constructional programme formidable in themselves, but the task of building up in war time, without seriously affecting the requirements of other services, a new industry of a most highly-skilled character necessarily put a heavy strain upon the organising and manufacturing ability of the country. The growing realisation of the increasing importance of aviation as an artificer of victory was now reflected by the concession of first priority to labour and materials required for aircraft production.

Supply of Aircraft

The science of aeronautics was in a state of constant and rapid development; improvements in engines, aeroplanes and their numerous accessories were constantly being worked out. But the interval between the discovery of an improvement and its introduction into the service was, owing to technical considerations, very much longer than was commonly supposed. Experience showed that, as a rule, from the date of the conception and design of an aero-engine to the delivery of the first engine in series by the manufacturer more than a year elapsed; the corresponding period for an aeroplane was about one-half as long. Consequently, plans had to be laid for a long period ahead, and these plans were liable to be upset by



Photos :]

[G.P.U.

TRAINING RECRUITS FOR THE R.F.C.

These photographs show some of the many sides of the training which recruits to the R.F.C. had to undergo before they were passed as air mechanics. No. 1 (top left), shows how riggers learn to cover a plane with fabric; No. 2, a travelling repair workshop; No. 3, lubricating and filling up with petrol; No. 4, bringing in the camera and wireless set after a plane has descended; No. 5, learning to erect an engine; No. 6, fitting sparking plugs.

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many uncertain factors. The hopes based upon the promising results given by the first experimental engines of a new design were frequently disappointed owing to difficulties of bulk manufacture, or to defects only developed after long trial in the air; new types of aeroplanes favourably reported on when first tried were found on longer experience not to give complete satisfaction, and yet it was impossible, if we were to keep ahead in the keen struggle for aerial superiority, to wait for full experience before placing orders. Risks had to be run, and new types adopted at the earliest moment consistent with reasonable assurance that they would constitute a substantial improvement on what was already in use. Orders had to be placed, moreover, for considerable numbers and for delivery over many months, as the large output required for the greatly developed flying services could only be obtained by bulk orders permitting a high degree of sub-division of work.

The next step in the problem was the balancing of the engine and the aeroplane programmes. Owing to the much longer period required for the production of engines than of aeroplanes, orders for the former had to be placed for relatively long periods ahead, before it was known what types of aeroplanes would be required when the engines became available.

The problem was complicated by the fact that manufacture and delivery rarely, if ever, proceeded in accordance with anticipation. The output of a particular type might be delayed for weeks, or even months, owing to some technical difficulty of manufacture. Moreover, as replacement of losses and expansion were proceeding simultaneously in the flying services, and the rate of wastage in different types of engines and of aeroplanes varied considerably according to circumstances, it was impossible to forecast with accuracy what engines would be available for the equipment of new types of aeroplanes after wastage had been made good. Nor was it possible to any great extent to adjust the programme by modifying orders once placed without disorganising supply. The problem did not end here. Whenever a new type was introduced provision had to be made for accumulating a sufficient "head" of spare engines, spare aeroplanes and spare parts of innumerable kinds, to keep the squadron to be equipped with that type in a condi-

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tion to make good the day-to-day wastage and carry out the constant repairs required.

The provision of the necessary personnel was a matter even more intricate.

The development in this matter during the war had been tremendous. In the early days of aviation, and even of the R.F.C., flying was considered the main factor of the airman's training; military qualifications appear to have been ignored until the experience of the battlefield came to make its demand on aviaional co-operation. Once again the British were late in the field, and once again an almost superhuman effort was necessary to make good the leeway so blindly sacrificed to the enemy. The business of training the military airman was transferred from the haphazard, though capable, hands of commercial instructors—begun in 1912; the Central Flying School on Salisbury Plain, under joint naval and military supervision, became a special school for completing courses, other training-centres being established, as the demand and scanty supply of experienced instructors warranted, all over the country. The actual flying instruction, to which great attention was paid, was held subservient to the training in military aeronautics. It was a dangerously lean period in British military aviation immediately following the outbreak of hostilities, for the simple reason that neither sufficient instructional aeroplanes nor instructors were available. Every available pilot and machine had been taken to bring the active service squadrons up to their fighting strength, and the new method of training—with new centres all over the country—was not begun until late 1915, when the necessary supplies and trained, experienced personnel at length became available. The latter policy, as an alternative to extending the existing stations, was not decided upon until after considerable discussion, and then for the following reasons: (a) owing to the extremely variable British climate, it was considered that by distributing the training centres as far and wide as possible, while the weather rendered flying impossible at, say, London, in the Midlands, or in Yorkshire, on the other hand, a beautifully clear day would ensure a profitable number of hours in the air, and *vice versa*; (b) as a limited number of pupils could train at one station at

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one time, this number could be greatly augmented by the establishment of a series of such centres; and (c), and most important, this system would also ensure, so far as was possible, that all parts of the new Army training in England would see and have some knowledge of military aviation.

General Brancker's Training Scheme

The scheme, of his own inception, was outlined by Major-General Sir W. S. Brancker at great length and in considerable detail in a lecture given before the Aeronautical Society, January 25, 1917. Events had been shaping up to this very necessary reorganisation since the outbreak of the war. It had been the custom in peace-time for Army officers who wished to join the R.F.C. to take the Royal Aero Club aviator's certificate at their own expense before being accepted. The system proved most unsatisfactory, as the standard demanded by the certificate was so low that pupils often qualified after about two hours in the air! During peace aviation most of the training took the form of flying pure and simple. Military subjects were taught to some extent on the ground, but in the air, as was only natural, the art of handling the machine, of landing it and of finding the way across country was all that mattered. In those days bomb-dropping, photography, wireless and fighting in the air were scarcely considered. When, however, the C.F.S.—Central Flying School—was developed, no pupil was considered to be a qualified aviator until he had undergone six—in war three months' training, and passed certain necessary examinations. Very soon it became recognised that this course of instruction was better than that provided in any other similar institution in the world.

Simplicity was the keynote of the system. Almost all pupils started in the Maurice Farman flight with a period of dual control instruction. They then had a spell of solo work on the Maurice Farman, including a few short cross-country flights. From that they were moved to one of the advanced flights, and were given dual control instruction either on Avros or B.E.2's, and so on, to solo on either one of these types. A particularly promising pupil usually had the opportunity of

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flying two or three other types of machines before he left the school. The final test was a cross-country flight, at which a height of about 3,000 feet had to be reached and a spiral landing made, with engine stopped, at its conclusion. Reconnaissance height in those days was considered to be 3,500 to 4,000 feet, and it was only the exceptional pupil who reached anything higher.

Central Flying School

It was fortunate, indeed, that the C.F.S. had been retained in the first mad rush of war. Thither came in due course the first large batch of new pupils, pilots convalescent from wounds, to pick up their flying before returning again to the front, and such experienced aviators as now could be spared from the battle lines, to undertake the all-important matter of the instruction of recruits. Every month the number of trained military aviators gradually increased. Soon the necessary personnel was ready to take over the control of numerous new training centres. Said the General, describing this development: "After two or three months of war the system was as follows: The C.F.S. was turning out pilots who were usually absorbed in replacing casualties abroad. There were a certain number of reserve squadrons at different stations in England from which Service squadrons were built up and broken off as they were completed. Generally speaking, the reserve squadrons carried out the preliminary training of pupils on Maurice Farman's only. These pupils, as they qualified, were sent on either to the C.F.S. or to a Service squadron, where they completed their training. At first the C.F.S. was equal to the demands made on it by the Expeditionary Force to replace wastage, but as the wastage increased new Service squadrons at home also had to produce their quota of trained pilots for the Expeditionary Force. The progress of these new squadrons was therefore governed by two factors. First, the output of material on which to train their pilots; and, secondly, the rate at which some portion of their trained pilots was taken away to replace wastage in the field. And eventually, as resources became available, we had to start reserve squadrons to carry out advanced training as well as preliminary. At this

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period our two great difficulties were: (1) A shortage of competent instructors; (2) scarcity of aeroplanes and engines. And we had a very hard struggle to make both ends meet during the winter of 1914-1915, after which matters began to very slowly improve. At the same time the experience of war taught us that a pilot required many qualifications besides those of flying pure and simple. First, wireless, photography and bomb-dropping all came into vogue and demanded extra training. A little later fighting in the air started, and this involved instruction in aerial gymnastics and the use of machine-guns. In the latter half of 1915 fighting in the air became a really serious proposition, and consequently the wastage grew much larger, so much so that during the winter of 1915-1916 the training of pilots had to be considerably forced and hastened in order to keep up with the demands, and the output of new squadrons had to be considerably delayed in order to get training on to a more thorough basis. Now I will take the career of a civilian who wishes to join the R.F.C. now. He first has to join the Service as a cadet and go through a course in the Cadets' School, at which military subjects, pure and simple, are taught. He gets a grounding of drill and discipline, care of arms, interior economy, military law and the use of the machine-gun; this course lasts about two months. From this the cadet is sent to a Flying Corps training school, where he begins his technical training on the ground. He goes through a course in the care of engines and rigging. He is given some ideas on the theory of flight. He is taught wireless signalling and receiving. He gets instruction in the care of machine-guns, in the use of the camera, in map reading, in the observation of artillery fire with models, and in his spare moments he gets a certain amount of drill. This course lasts another two months, and if he gets through this successfully he is given a commission on the General List. He then joins a preliminary training squadron as a pupil, and starts his instruction usually on the Maurice Farman, his training both in military and technical subjects going on concurrently. After reaching a certain standard of efficiency, and having completed a certain number of hours in the air, he is sent on to an advanced training squadron or Service squadron, where he learns to fly Service

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types of machines for military purposes, and eventually qualifies for his wings. He is then gazetted as a Flying Officer of the R.F.C., and posted to a Service squadron. If he shows exceptional promise as a pilot after his qualification he is sent to the C.F.S., where he is given extra high instruction on fighting scouts. During the period of advanced training he goes through a course of aerial gunnery away from his squadron. The total time in the air usually required to reach the qualification stage is about 30 hours solo in present circumstances; but, of course, the length of time that it takes to reach this standard depends entirely on the matter and the number of aeroplanes available. During the winter it works out to about four months, but in the summer it is considerably shorter.

“The way in which war has forced a higher standard on us is remarkable. There is only one point which has simplified training during the past two and a half years. The modern designed aeroplane and the latest engine make flying much easier than it used to be. Aeroplanes are usually comparatively stable, and engines have a considerable reserve of power, and are far more reliable than in the old days, and these two factors have helped a good deal in the training of pilots.”

The System in Operation

A last interesting point to note with regard to this training system before we pass on to its fulfilment under active service conditions is the relation of the British pilot to his observer. The most unexpected people made good pilots, and very often the most promising ones in training never attained more than mediocrity in the air. While physical perfection was desirable, there were cases on record of men suffering from physical defects such as deafness, and even with artificial limbs, who proved first-rate aviators. This was because they possessed sound nerves, the most-valued qualification for the war in the air. In addition to the personal responsibility for his machine, the observer's life lay always in his pilot's hands. Unlike the enemy, the R.F.C. made it a rule that almost all pilots were officers—the N.C.O.'s very soon got commissions if they did well—while the observers, although officers as a

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rule, were absolutely under the control of the pilot; being permitted, after a certain period of successful work as observers, to learn to fly, and usually made very good pilots.

This, then, is a brief outline of the evolution of the Air Force as it was about to embark on that last dramatic stage of the war in the air which set in with the British infantry advance in March, 1917. British airmen, during those thirty-one days, accounted for 84 German machines, which were officially classified as follows: Destroyed, 14; driven down, damaged, 34; and out of control, 11; brought down, 22; fell in our lines, 3. As against this, eight British machines were brought down in air fights or by anti-aircraft guns, and 50 were returned as "missing." It was an equally active period with the French aviators, who secured 49 German aeroplanes, which were reported in the following categories: Destroyed, 10; fell in French lines, 4; brought down in air fights, 27; by anti-aircraft, 7; captured, 1.

The aggregate of losses on all sides during March was 262, and was made up as follows: German (based on the British and French daily *communiqués*, 133; French (on the assumption that the German reports were trustworthy), 71; and British (acknowledged by General Headquarters in France), 58. The enemy 84 to 58 British losses, compared with 41 to 23 in February, 41 to 15 in January, 35 to 10 in December, and 57 to 32 in November. In September of 1916 the proportion had been at least 100 to 48, and of the 100 53 were reported specifically as having been destroyed.

CHAPTER V

BEFORE ARRAS

The R.N.A.S. Co-operate with the R.F.C. on the Western Front—Events of Forty-eight Hours—Reconnaissance before Arras—An Incident behind the Enemy's Lines—Arras, Artillery Direction—Mirage—Albert Ball and Others—Adventures by the Way—Thirty to One—The German Circus—The Heaviest Day's Fighting of the War—Ten Thousand Feet in Flames—One Boy and Three Fokkers—Albert Ball, V.C.—The Great Month of May—And a Battle of Some Consequence.

THERE were no more indefatigable fighters in the war than the aviators. They saw the clock round in the air, week in, week out, month and month, year after year, and never grew weary. In the first gleams of sunrise, flecking the blue skies at the noonday, churning their homeward way amidst the gathering shadows of the sundown, how the enemy grew to fear and abhor those gallant young pilots of the R.F.C.! They held them to be supernatural; they had good cause. Day and night alike saw the British airmen equally alert over the enemy lines. By night the grey shadows of the gaunt bombers would toil up against the eastern sky, enigmatically disappearing into the night and the enemy's country. Off the fighting scouts would sweep into the air by day to engage some enemy amidst the clouds, to search out and signal hostile batteries, or to swoop low and scatter infantry and machine-gunners with a shower of bullets. Day after day during the great battle before Arras our airmen went back across the German lines, making thousands of flights and blinding the enemy power of observation by chasing his aeroplanes away from the lines, others taking thousands of photographs of the enemy trenches, engaging enemy battle squadrons, effectively checking his infantry advance, at the cost of their own lives, in many cases, saving our infantry great losses by keeping down

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the fire of the German batteries, destroying their kite-balloons and signalling the preparations for enemy counter-attacks, and dropping tons of bombs on ammunition dumps, railheads and transport. Always they were overhead, the droning song of their engines the accompaniment of the battle below, until, at last, the Germans hardly dared to venture beyond their own lines.

The air services—the R.N.A.S. were now co-operating with the R.F.C. along the Western Front—mainly were responsible for the Allied success. "French aviators congratulate their British comrades on their superiority over their adversaries, which they have never ceased to retain during the recent engagements," was the opening phrase of an official message of April 24 to General Trenchard from the French Aviation Corps, which continued, in lavish praise: "They thank them for enabling French aviators to obtain the splendid success recently by giving them their generous aid. They declare that, amazed as they are by the exploits of the British airmen, they will be inspired by the same principles, and will make it their ambition to apply the same methods to French aviation."

April 5 and 6 were typical days of this period which began late in January, when the sunny fields still sparkled under their heavy mantle of winter snow—a blinding, white landscape against which there was no visibility; when our kite-men could see nothing from their baskets, not even the flash of guns that went booming out sullenly all day long; when an odd German aeroplane took advantage of the weather and came sneaking low through the white mist, hoping to drop bombs before our airmen could see and chase them, or our "Archies" got their target, they took the risk and paid the price. Those two typical April days broke all records.

Events of Forty-eight Hours

The bare facts of that forty-eight hours are that British aviators took over 1,700 photographs behind the enemy's lines, made seventeen successful bombing raids, dropping eight tons of bombs, and drove down 15 hostile machines, crashed, another 31 damaged, and brought down two kite-balloons in flames. They bombed by night; by day they continuously were

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harassing the enemy's communications a long way in the rear. Aerial co-operation with the artillery continued during daylight unhindered, except by weather, although repeated attempts were made by the enemy to prevent this important work. Aerodromes, ammunition depots and railways were raided a long distance behind the lines, additional to numerous small raids. All the time intense fighting between large formations waged overhead. Our casualties were 28 machines missing, a large number of which were known to have been shot down over the enemy's country. It was known that the enemy suffered very heavy casualties. In one case the observer was seen to fall out of an enemy machine, which went down out of control in a spin, and in another the fighting was so close that the enemy pilot was seen to fall forward, his machine nose diving out of control.

Upon another day a week later—the twelfth—in spite of exceedingly bad weather for aerial work, our aeroplanes were equally active, seizing every opportunity to harass the German troops with their machine-guns. During a short fine period occurred one of the greatest aerial battles of the year. One of our naval squadrons, while escorting bombing machines, was heavily attacked by a number of hostile aeroplanes. Without suffering any loss itself it destroyed three of the attacking machines, and drove down three others in a damaged condition. Never did our airmen combine their functions with more brilliance. While some were finding the targets and reporting them to the artillery, others dived down like hawks and emptied many drums of cartridges into the assembling Germans, whom they could see tumbling over right and left. Very much at the same time another of our fighting planes brought down a German behind our lines, and the pilot and observer were taken prisoners. In conjunction with the infantry they very nearly succeeded in capturing a battery of German field guns. The picture is complete with Mr. Philip Gibbs' description of the air war in the big advance round Bapaume.

"An aeroplane had crashed to earth in the shell-blasted fields, and it was one of ours. A car came along, and I saw a young pilot lying back wounded, with another officer smoking a cigarette, but grave-eyed and white. A little farther on I saw

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the fallen aeroplane. Pools of red mud were on each side of the road and in the middle of it. . . .

"Flights of British aeroplanes were up and singing with a loud, deep humming music, as of monstrous bees. Our Archies were strafing a German plane, venturesome over our country. High up in the blue was the rattle of machine-gun fire. . . .

"Our cavalry patrols are over the hills and far away. Our infantry patrols are pushing forward into new territory, so that only aeroplanes know the exact whereabouts. As one aviator has just reported: 'Our men are lighting fires and taking their dinners at places of the map.' They are going into pubs which have been burnt out to find beer which is not there. North and east of Bapaume our patrols have gone beyond the villages of Rocquenes, Bancourt, Favreuil and Sapignies. . . .

"Much farther south, in the neighbourhood of Nesle, French and British cavalry patrols came into touch to-day, and one of our aviators reports that he saw French civilians waving flags and cheering them.

"The Germans have a cavalry screen behind their rear-guards. They were seen yesterday north of Bapaume and southwards beyond Roye. And some of them were chased by a British airman at a place called Ennemain. He swooped low like an albatros, and brought a man off his horse by a machine-gun bullet. Others stampeded from this terrible bird."

Reconnaissance before Arras

With the dawn, and after the great bombers had crept home to roost, the day's work began in reconnaissance, in photography and scouting, patrolling the skies for roaming enemy aircraft, and in the aerial direction of the British heavy artillery, and in daylight raids in co-operation with the hard-tried infantry. There was a German commander who ordered about this time: "Every man is to find himself a hole, and is not so much as to show his nose except when the sentries are detailed." The reason is obvious—high compliment to the British eyes from the skies. "The aim—and success—of the British airmen that morning was quite exceptional, due to

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the fact that the officers and men of the 8th Company, 2nd Battalion, 104th Regiment, were swarming about and making themselves at home. This will not do, as we are at war. *Every movement is seen from enemy aeroplanes* or from the neighbouring village of Longueval. For this reason the trench must appear dead." The italics are not those of the German commander.

It was an easy enough matter for German generals to order, for the rank and file to obey was another thing. Do what they would, they could not escape the prying eyes of the British observers, who watched and recorded the slightest movement inside the enemy lines, of whom Sir Douglas Haig, on February 28 and many succeeding days, reported: "Much valuable reconnaissance work was carried out by our aeroplanes."

The battle developed; fiercer, more thorough, seemingly never sleeping grew our aerial observation. They saw many strange sights did those sharp-eyed young men of the Flying Corps. Looking from the air on the earlier days of March, 1917, little was to be seen behind the German trenches, only lines and lines of defences made by slave labour and banks of wire as much as 50 yards deep. They looked like belts of young timber.

An Incident Behind the Enemy's Lines

The Germans, maddened to desperation, on the morning of the sixth concentrated every available aircraft in the Arras skies, sweeping far and wide with strong squadrons of battle-planes, to stop the British aerial reconnaissance. All day and far into the twilight, far down the battle front, the aerial battle raged. In the morning following, no less a number of our reconnaissance planes hovered over the enemy lines, no less daring were their pilots in their low, swooping bomb and machine-gun attacks on the German infantry in their trenches, and on railways and gun emplacements, headquarters and ammunition dumps behind the enemy lines. Further, the aviators furnished the General Staff with most valuable information throughout that day and the day following, throughout the week, and the next month and the month following. We

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remained in control of the observation of the battlefield, and the result was seen in the deadly work of our artillery and the success of our attacks.

Necessarily, we lost some machines. Now and then an enemy battleplane got as far as the lines and attacked one of the British observation planes, when the odds went against our man. But the fact, the outstanding fact, was that the British observers continued to do their job when the enemy's did not. All day unceasingly British aeroplanes were patrolling the battlefields, observing, photographing, reporting and assisting the guns. The enemy's machines were not doing so. This aerial effort was at its height over the enemy positions of Bailleul, Vimy and Petit Vimy.

A most unusual incident occurred on March 6. Due to engine trouble, a British pilot and observer were forced to land their machine some half a mile over and behind the German trenches. Spectators within our lines, watching from various observation posts, expected the enemy immediately to turn their machine-guns on to the lamed plane, and, as a precautionary measure, ordered near-by British batteries to fire upon the machine and destroy it as soon as the two occupants were clear. Judge of their surprise, when nothing happened. Without interference, pilot and observer clambered out and began walking towards our lines, beating their breasts to warm themselves, and no signs of any effort to molest them were perceived by the many watchers on the British side. The German garrisons had sneaked away during the night!

Arras Artillery Direction

The British machine had been engaged directing the fire of our heavy artillery over the lines. As part of the routine duties of a reconnaissance pilot, it was yet a distinct phase; if anything, more adventurous. In the long drawn out battle of Arras it was due entirely to this aerial co-operation that we maintained that furious, incessant and deadly bombardment to the north of the Somme. It was the direct effect of the fine weather which favoured the Allied aviators in their unequal duel, and the contact with the enemy artillery was not without its reaction. In the sector bombarded, afterwards,

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we were able to locate a large number of enemy batteries, which had tried to counter the English batteries, but the duel turned to the confusion of the Germans. The positions of their big mortars were notified by our airmen as entirely destroyed, and the German trenches also suffered greatly. Needless to say, the life of these artillery direction pilots was not uninteresting.

Every day they were up and circling round over the more unhealthy side of the trenches, in spite of German High Explosive puffing clouds about them. They signalled down to our field batteries, and the gunners this day—April 3—found the target, a human target, moving between two villages. In the words of one of the officers directing the operation, "we made a mess of them," and that was an exact description. To give anything like the full number of these daily episodes, or to attempt any sort of detail would need a volume in itself, but Mr. Philip Gibbs supplies two such which cannot be omitted from any history of our flying men in the Great War. One is a most absorbing story of how two R.F.C. officers brought back a hopelessly damaged machine, the other an extract from the letter of a young flying officer to his father, even more intriguing.

"Two of our officers," wrote Mr. Gibbs, "were leading an offensive patrol, when a high explosive shell burst just behind the right lower wing of their aeroplane. The machine was completely riddled. Three tail booms were cut, one blade of the propeller was blown away, and all the controls except the elevator were put out of action, so that the aeroplane became uncontrollable. The junior officer of the two saw that he must act quickly to prevent a crash. He climbed out three-quarters of the way to the tip of the right wing in order to balance the machine, and at 900 feet above the earth steadied it. At 200 feet the machine began to spin again, but by another balancing trick on the wing the pilot and observer were able to land in safety."

It was his first experience of mirage in the skies that furnished a companion pilot with the facts of the following unusual adventure. "I had often wondered," he said, "what it would feel like to see a machine coming straight for one

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and to feel that a collision was inevitable. I had the experience this afternoon, only the collision did not take place. I was on patrol with five other machines over the lines—by the way, I am writing this like a novel, but I feel like it—and had just gone into a cloud bank. Just before getting in I saw the machine on my right turning to cross in front of me. All of a sudden I saw a machine just the same as my own appear out of the cloud about fifty feet away, making straight for me. *Instinctively I jammed my nose hard down and went as near a nose dive as possible; the other bus did the same.* I turned; the other turned into me. I was in a cold perspiration all over by this time, so I thought ‘Here goes; if I am going to crash it might as well be complete.’ So straight for it I went. We got closer and closer, and biff! my machine and—its mirage in the clouds met.

“It seemed like a hideous nightmare, and I can still see that machine doing its utmost to crash into me. I think I can say I have had the full horrors of a collision in the air without its actually taking place. I finally got out of the clouds and had not the faintest idea where I was, but about 15 seconds after ‘Archie’ reminded me that I was a little too low over his lines. Having got that off my chest I think I will go to bed.” A short diversion on the matter of mirage is, perhaps, permissible at this point.

Mirage

One of the most remarkable cases of aerial mirage occurred later in the war, during the summer of 1918; an aerial battle fought over Belgium being witnessed in the mirage of the Sussex sky. “One Sunday, about midday,” recounts a spectator, “we saw a great number of aeroplanes apparently about one mile away south-west, and perhaps 1,500 feet up, going through evolutions of an entirely hostile character to one another. I should say there were anything between 25 and 40 of them, all of them over the top of the Downs, and spreading inland at first. My friend and I settled they must be squadrons practising. We watched them for, I dare say, five minutes, and then, as they drew away over the Downs to the sea, we ran about 150 yards south-west from where we were to get

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a better view. But we never saw another sign of them. We had seen, as we thought, certainly two, and perhaps three, come down out of control from our first stand there."

Investigations into this phenomenon furnish us with the facts that on this same day, and at the same time, an aerial fight actually took place between two large British and German squadrons over St. Julien, somewhat to the east of the Ypres Salient. The incident, however, differs from the original narrative, in that the altitude given is between 8,000 and 9,000 feet, and that six or seven of the planes dropped out of the fight. Geographically this point lies some 95 miles directly south-east of the South Downs, in which direction, it will be recalled, lay the prevailing wind. Also the correspondent states that the sky was clear and there was a bright sun. All of which circumstances lend themselves to the possibility of mirage—an optical illusion due to unequal densities and refracting powers of adjacent strata of the air.

Quite early in the war a British pilot had a most interesting experience with mirage. He had sighted another machine ahead of him in the clouds. He gave chase for nearly half an hour. Then he observed that every time he "banked" to the left the stranger did likewise, and the same thing happened when he turned to the right. He then discovered that he had been chasing the mirage of his own machine. Usually, upon land, this phenomenon is best seen over desert plains in hot climates; the intense heat of the sands greatly rarefies the air in contact with them, and rays of light coming from distant objects, as villages or the trees upon oases, are gradually bent by approaching this rare stratum, until they strike it at an angle greater than the limiting angle; "total reflection then occurs, the air near the sand acting as a mirror or a body of water, in which inverted images"—three images are usually thrown, and only the centre one is inverted—"of the objects are seen." Arab travellers with desert caravans have often related similar bitter experiences. Large pools of water have been sighted in the distance, which, on closer investigation, have proved to be non-existent, with the picture of the water constantly receding.

Perhaps even more startling was the later experience of

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the observer of a British reconnaissance aeroplane flying over the Sinai Desert. He reported to his pilot that he had observed large bodies of Turkish troops advancing behind a range of sand hills, in close formation. They went lower to investigate, but only a boundless and deserted sandscape met their eyes. The pilot commenced to make quite uncomplimentary remarks about the veracity of his companion's observational powers. Still the observer persisted, giving details of the advancing column. Then the pilot recalled the position of a certain British outpost, the only troops in the locality, and some thirty miles to the east. The aeroplane arrived in the nick of time to save their companions from a nasty surprise attack.

Another instance of mirage furnished in the war was that of a British "ferry pilot"—an airman engaged on flying new machines from Farnborough across the Channel to bases behind the fighting lines, and bringing obsolete craft back to England in the same manner. In mid-Channel he encountered—or rather imagined that he had encountered—an enemy machine returning from a raid on England. It required forty minutes for him to realise his pardonable mistake. Over water spaces mirage is, if anything, more prevalent than on land. The looming of ships or of distant shores, on the sea or lakes, is seen when, owing to the presence of dense vapours or to a considerable difference of temperature of the water and air, the strata of the latter near the surface are of very unequal densities. Hence it is more frequent in the morning, or when the air is misty, after rains, in the summer and autumn. For a distance of 25 miles the angle of reflection is 7 degrees; for 5 miles 6 degrees—and disappears at 300 yards, within which distance, therefore, no appearance of mirage can occur.

A Long Beach (U.S.A.) man recently assured me that, when lying on the beach of that town, before noon, often he was enabled to see appear in the sky a great city of tall sky-scrappers—the mirage of Los Angeles, some thirty miles distant. Another authentic instance is that of Dr. Vince, who, on August 6, 1806, at 7 P.M. of a summer's evening, saw from Ramsgate, at which place usually only the roofs of chimneys and houses are visible, the whole of Dover Castle,

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appearing as if lighted up and placed bodily on the near side of the intervening hill. Finally, there was the case of a seaplane pilot on submarine patrol along the Belgium coast, one summer's day of 1917. Suddenly he was startled by the sight of a fierce battle between a British and two German seaplanes; a little below and on his starboard side. The British machine appeared to be on fire, and he dived down immediately to the rescue. Judge of his astonishment when no trace of either machine could be seen. However, he determined to search the water's edge, in the hope of rescue. He did so, systematically, for several miles in all directions, and finding nothing, finally turned for home. Later in the afternoon it was reported that a British machine had been brought down in flames off Ostend.

All this is by the way, but it serves to give the reader some idea of a curious condition which was to be found on occasions in the upper air; a real danger to the flying man in the war.

Albert Ball and Others

It was no less a person than General von Hoppner, Commander-in-Chief of the German air forces, himself, who said, in an interview with a Dutch journalist: "The English show in air fights that they are of the Germanic race, for they seek fight, and fight until either they or their opponents are killed." Omitting the characteristic German simile, the statement fits the situation very neatly. The same day of the interview Captain Albert Ball, the first and greatest of the British "aces," went down to his death. The coincidence is significant. It was Ball and other brilliant contemporaries, not to mention hundreds of other equally daring, equally capable young men, whose names were not revealed for certain reasons which will be explained later in the chapter, who achieved that undoubted ascendancy over the German aviators, which General von Hoppner himself was forced to admit at this period.

The matter of aerial ascendancy, vague enough in itself, is based on a fundamental principle of military operations. It is a matter of losses, and how far those losses are justified by the results attained. During April 5th and 6th, for example, occurred the greatest aggregate of British and German

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aerial casualties so far in any two days' consecutive operations; our airmen caused 15 enemy machines to crash to earth, and drove down 31 others under conditions which render it pretty certain that many of these were either destroyed or hopelessly disabled, and the rest of them damaged to some extent, and even that does not represent the true aggregate of enemy casualties. It was a practice with the R.F.C. never to claim that any enemy machine had been shot down or damaged unless the result was beyond doubt. There were many such instances reported on those two days. During the same period we lost 28 aeroplanes.

All these machines had carried the aerial war well over the enemy territory. Some of the combats were actually fought as far back as 50 miles behind the front line. This was essential in order that our artillery and photographic machines might remain comparatively immune to continue their important work closer in. The whole doctrine upon which the British air service worked was one of bold offensive. This does not necessarily imply that every flight made fighting its primary objective. Bombing was an essential feature of aerial warfare, but to carry out this work meant invading the enemy zone and courting attack.

When we talk of aerial ascendancy it is well to realise just what the phrase means. Ascendancy in aerial warfare purely means the power to carry out at all times any operations which may be decided upon. In the first place and the last, it was the battle airmen who dominated the situation in the air. In this case those forty-six odd victories of the British battle pilots had played a great part in the temporary ascendancy we held over the enemy at this time, yet no single name of those forty-six victorious airmen was mentioned in the British *communiqués*.

The British Air Force authorities did not favour the publication of the names of fighting pilots, with their "scores" of German machines, because this method did not commend itself to the British temperament. The flying officer, and especially the fighting pilot, was quite clear about this, and rightly or wrongly, thought it would be unsporting, bad taste, to invite public attention and popular admiration for individual pilots,

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because of the opportunities offered them, and successfully made use of, to bring down enemy machines. As one of them wrote about this time: "I am not pot-hunting; I am doing my job, and trying to help win the war, like every other officer in the R.F.C., and in the Navy and Army, too. Platoon commanders are not advertised as having shot so many 'Huns,' yet they do shoot a good many, in circumstances a good deal less comfortable and just as dangerous as mine. And then, again, what about the R.F.C. observers—some of the best gunners we have? Why should their names be left out? I go into the air perfectly equipped at all points to bring down Hun machines. A pilot on artillery observation or photography work goes up to do a highly necessary job, and perhaps has to spend several hours over it, and in any case has other work to do, and cannot go strafing, however much he might like to. Why should I be advertised and glorified, any more than he is? We both try to do our job, and nobody can do more. When any of us earn a decoration we are gazetted and the thing is on record. For the rest, we play for our side and for the good of the R.F.C. No need to advertise individuals."

Equality of Opportunity

It is, of course, undeniable that there could not be equality of opportunity for flying officers in the matter of bringing down enemy machines; and it would be absurd to suggest that the highly difficult and hazardous work performed in bombing, reconnaissance, contact-patrol, ground-strafing, and many other special duties was no whit less honourable and deserving of praise than the work of bringing down German pilots.

There was another aspect of this matter which is worthy of consideration. By methods of advertisement, and of glorifying a few "star" pilots to the point almost of deification, Germany had hoped to popularise her air service and encourage recruiting. Captured documents had established beyond question the fact that the results had been disappointing to the German High Command. Further, when a pilot so glorified, so carefully made into a national hero was brought down—as was later the case with von Richthofen—the sense of national

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loss was acute, and the blow to the mora'e of the German air service was very serious.

One method, in a word, suited one people, and another was needed for a different people. The British adhered in this matter to the method which suited them best, and that which was most in accord with their naval and military and sporting traditions.

During the battle of Arras, though day after day, and for hours on end, overhead was heard the continued tattoo of Lewis guns, and though in a great sweep of sky could be tracked the British flying squadrons hotly engaged with hostile machines by the white high explosive clouds which followed them, this honourable incognito was maintained throughout, and till the end of the war.

One reason already has been supplied, another was the difficulty of judging fairly the number of victories claimed. It was very hard to follow the progress of these aerial battles from the ground, and only rarely possible to distinguish British from German machines, except by the cloudlets of our anti-aircraft barrage; as far and high could be seen daring specks chasing one another through the blue of the sky, touched sometimes by the sunlight, so that for a moment they were all golden or glistening or white as snowflakes, and down to earth crept the drone of the engines and the little hammer knock of the Lewis guns.

Adventures by the Way

One of these unknown airmen, on an evening before sunset, early in the battle chanced upon a German Albatros amidst the rolling clouds, which accepted fight, and for an hour they did every trick known to flying—stalling, banking, side-slipping, looping in order to get in the first shot. It was the German who tired first, though he showed himself master of his machine. There were pilots—mere youths—in our air service who had killed six or seven Germans in single combat, a few who had accounted for many more, and went off again for a morning's hunting of men as though on a grand adventure. Yet they knew the risks and the fortunes of war. They could not have all the luck all the time. When the turn came

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it was quick to end, or if hit and left alive they did amazing things up there in the high skies to save the final crash. An evening or so later—this would be about the middle of April, 1917—two young British aviators were attacked by five hostile aircraft, and both were wounded, one in seven places, but they destroyed one of the German aeroplanes and landed safely though their own machine was pierced by many bullets. On another evening of the battle of Arras two hostile aircraft were engaged by one of ours and forced to land, though one of the officers had his collar bone broken by a machine-gun bullet. Day after day these episodes were repeated, and machines and officers sometimes failed to come home. But when another dawn broke our air squadrons again took the air and flew over the storm of battlefields, over Arras and away.

Thirty to One

This is the true record of one young airman as he flew over the lines. The adventure might have ended disastrously, but for British determination, coupled with characteristic, sheer audacity. A formation of British machines had been carrying out some important operations well over the enemy's country. On the return journey, the weather turned suddenly hazy and one of the pilots lost touch with the formation in the clouds. The British pilot set his course due west and flew on for some time. Having made what he thought was sufficient allowance for the distance to the British lines, he put down the nose of his machine and saw beneath him an aerodrome. The wind, however, had freshened considerably and, so far as covering the ground was concerned, he had been making only half the speed shown on his air speed indicator.

As he circled over the aerodrome preparing to land, a German scout machine suddenly appeared from the clouds above him, and immediately dived to the attack. Marvelling at the unusual temerity of the German in daring to attack over an English aerodrome, the British pilot checked his descent and opened fire on his attacker. At this moment he became aware that no fewer than 30 German machines were actually climbing towards him from the aerodrome. The air, in flying parlance, was "stiff with them."

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Realising now that he was over an enemy aerodrome, he decided to leave a memento of his visit. He dived towards the first group of the German squadrons, both he and his observer firing on every German machine upon which they could get their guns to bear. The enemy pilots appeared too bewildered by the astounding audacity of the British airmen to attack them effectively at first; and their own tremendous numerical superiority seemed further to confuse them. One German machine burst into flames in the air, two more went down spinning and side slipping completely out of control.

Four enemy scouts had by this time got into position to attack—clinging to the tail of the British machine. Two of these were sent blazing to earth. Shaking himself clear of the remainder, the British pilot opened his throttle and sped homewards, leaving on that German aerodrome three blazing wrecks and two other crashed machines as a highly satisfactory outcome of what might have proved a fatal mistake.

In the three months ending May 31 many great reputations were made among our airmen, some closed in a cloud of glory, while others, like evening stars, first peeped out upon the horizon of the glorious future. The British aerial activity varied, as usual, according to the weather conditions. The storms and rain and wind prevented aviation to any considerable degree in late February and the first two weeks in March, but an encounter took place on the sixteenth of that month between a patrol of eight of our aeroplanes and 16 enemy machines. As a result of twenty minutes' fighting the hostile formation was broken up, two German aeroplanes were destroyed, and two others were driven down damaged. All our machines returned. There was great activity the following day in the air, and a number of large enemy formations were engaged by our machines and dispersed—the British High Command at this time struggling to remove a small German salient which had encroached on our line near St. Eloi, to the depth of about 100 yards on a front of 600. It was resolved to straighten our front, the place being roughly defined by the cross-roads south of St. Eloi, where the Messines and Warneton roads branch off. The first step was to drive the enemy aeroplanes from the air over this area. It was in this same endeavour to blind the

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enemy's eyes that day, in the course of fighting seven hostile machines were brought down and nine others driven down damaged, while eight of our machines were reported missing.

In the course of their fighting of March 18 occurred one of the most heroic flights ever made by a British aviator. He was one of those who did return, for his effort cost the Flying Corps the loss of an invaluable life. As, solitary, he went sailing unperturbed over the Lens area he was attacked by a large party of enemy machines. He fought till his ammunition was all exhausted, while making for home, himself and his machine being almost shot to bits. He had one eye literally shot out, a bullet in his body, and his foot smashed. His machine was riddled. In spite of all this, however, he made his report, in which he apologised for making a rather rough landing because his smashed foot impaired control! His duty done, he died.

On March 22 one of our aviators bagged Prince Frederick Karl of Prussia as a victim.

The German Circus

For the first time, on April 8, the far-famed and notorious enemy travelling circus, a mobile unit of expert fighters, which afterwards always forgathered wherever he meditated an offensive, appeared over Arras. That clear air and compact April clouds with well-defined edges gave ideal conditions for war flying in all its many branches, and with the first signs of the settled weather both sides brought into play all their new aerial inventions and devices. The standard of flying was higher than ever before. British aviators who, for many weary months behind the lines, had been practising nose diving, like tent pegging, had increased their art beyond telling. From 16,000 feet, where they were scarcely visible, or from the ambush of a cloud, they now swept down like a plummet to bomb a train, fire a balloon, or riddle a body of men with machine-gun fire. They fought far and wide, regular fighting formations attacking infantry as far behind the German lines as Douai; bombing and bombarding even more distant spots.

The enemy, who as incessantly thought out new and ingenious devices for his anti-aircraft defences, did not prove as successful. For instance, a British pilot, who had frightened

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down two and set fire to another German kite-balloon, on the morning of April 8, was fired at from the ground by shells which resembled, if anything, inflammatory rockets or Roman candles. Instead of avoiding the menace he swung round, dived even lower, and proceeded to bombard the battery, with due and successful result.

The greatest development of all, however, was in aerial combat. Apart from the extraordinary adventure of a British airman who was hit and his machine set on fire by an enemy shell at a height of 10,000 feet, nose-diving to earth a mass of flames, yet reaching his drome alive, many wonderful things were accomplished. The latest planes on both sides were now much faster in speed; the fighting now so quick and skilful that the slower, older machine had about as much chance as a fieldfare against a hawk. One of the newest and fastest British machines destroyed five of the enemy in one flight. Six German aeroplanes were brought down on April 23, and fifteen others were driven down out of control. In one engagement a hostile formation of eight machines was attacked by two of our aeroplanes, which brought down two hostile machines, and drove down a third out of control.

The Heaviest Day's Fighting of the War

April 24, 1917, there was a greater amount of fighting in the air than had before taken place in a single day. British aeroplanes attacked enemy machines wherever they could be found, with striking success, going far behind the German lines and bombing his railways, dumps and aerodromes, and compelled him to give battle. In the course of the fighting fifteen German machines were brought down and destroyed and 24 others were driven down out of control, the majority of which probably crashed. One was a remarkable instance. "A British and a German machine," wrote Mr. Beach Thomas, who witnessed the occurrence, "charged each other direct from a considerable distance. The German, who must have been a very stout fellow, kept a perfect bee-line to the very end, apparently seeking mutual destruction. Our pilot turned at the very last moment, and so rammed not the centre, but the right wing of the opposing craft, which he carried away, and the

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German plane fell in a heap on the ground. The British machine was very badly damaged, but was still just airworthy, and the engines carried it in a wobbling declivity safe into harbour." The following day, a British air patrol fought twelve successive engagements near Douai. On its return two aeroplanes missed their way and found themselves in the thick of it above the enemy lines, yet succeeded in fighting their way back to our side of the lines.

One machine, however, nose-diving in flames from 10,000 feet (almost two miles), the two British airmen aboard, an Englishman and a Canadian, displayed unusual presence of mind. Curiously enough, they could see nothing out of the ordinary in what they did. The reader himself can judge, for here is the observer's story as he told it in hospital:

Ten Thousand Feet in Flames

"We were on an O.P. (offensive patrol) between A—— and Y——. Our stunt had taken us about four miles over the German line. After a quiet hour or so, suddenly, out of the clouds right behind us, appeared a formation of twelve Albatros scouts. There were eight machines in our formation, and soon, at the height of 10,000 feet my pilot and I were actively engaged with one Albatross. We exchanged a stream of bullets, and seeing the formidable formation we were up against, my pilot did a lot of stunting around, including S.A. turns, side-slips and tail-slides.

"But this Albatros Scout proved a quicker machine than ours, and our particular Hun got right on our tail. He peppered our tank with machine-gun bullets and, the pressure being in the tank, the petrol was squirted all over the machine, which immediately caught fire.

"My pilot promptly stuck her nose down, engine full-on—for the short time she lasted. This particular type of machine is a 'Pusher' with the engine behind, and the petrol tank under the pilot's seat; so you can imagine the pilot's situation, sitting right on this tank, which was squirting flaming petrol in streams backwards, throwing the liquid all over the plane. For that reason the flames would not burn either pilot or observer, until they actually ate their way into the framework. If we had

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been on a 'Tractor' we should not have had a snowball's chance, and I should not be here to tell the story.

"The first thing that came into our minds, naturally, was to get down as quickly as possible, so we continued our headlong, hurtling nose-dive, making a speed of close upon 150 miles an hour.

"When we were about 6,000 feet above the earth, my pilot shouted to me: 'Let's jump, Bill.' He was naturally much worse than I, and his leather coat was all ablaze. But, seeing our front line of trenches ahead, I pointed to them. Naturally, it looked to him as though we must both be killed, and he was guessing which would be quicker—to jump or wait for more flames!

"Then I managed to get the fire extinguisher playing on the pilot, keeping the flames from his face and hands as much as possible while he retained his hold on the joy-stick. He certainly did keep control to an amazing extent, in the circumstances.

"By this time we were down to about 3,000 feet, the fire extinguisher had lost its usefulness, and the fire burned its way down through the nacelle. The floor of the nacelle or cockpit, burned away and broke through, letting the three Lewis guns and the drums of ammunition fall through. *I fell through, too, but caught hold of the rail round the nacelle, and pulled myself back and up, perching on the side of the cock-pit.*

"We were now at less than 2,000 feet, and still descending at a fierce pace. My pilot managed to retain some control even now of what remained of our fine old machine. As we continued our nose-dive, with No Man's Land rushing towards us, our front line trenches got so close that we could see the up-turned white faces of our own soldiers watching us.

"When we got to about 600 feet our engine fell out, but we still clung on, clinging to the framework.

"My recollections cease from when we got to about 100; the last thing I remember is seeing Tommies running about with stretchers to the spot we were likely to hit. I guess my pilot fainted a few seconds before I did, but he had flattened out so that we must have 'pan-caked' from—oh well, something less than 100.

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"I awoke the next morning at B—— Hospital, and found that I had a fractured ankle, and burns on body and face. My first inquiry, naturally, was about my pilot, and I discovered him in the next bed; a ghostly sight, swathed in bandages. He had burns all over and a bit of a hole in his body, where the joystick hit him in landing. But there we both were, with plenty of kick left in us, and you can bet your life I did not strafe him regarding the precise quality of his landing."

Another pilot of that same patrol, whilst flying 14,000 feet, observed a large enemy two-seater machine directly beneath him. The Englishman dived at once and after firing several bursts at close range, he saw the German machine turn over on its back, and begin to spin, whilst thick black smoke began to pour from its fuselage.

Chancing then to look up, the British pilot saw four hostile scouts (which had been waiting in the clouds) diving towards him.

A stiff fight followed, but in the end the enemy machines broke off the engagement and dived for home. Even odds of four to one did not encourage them to continue the struggle with this British Scout, though as a general thing the German airman would fight at these odds. Two to one they had for a long while shirked where British scouts were concerned.

One Boy and Three Fokkers

Last of all this daring band—it is not surprising to find that the immortal Ball was leader of this same formation, in this same action—was a fight between a youthful British pilot—a mere boy—and three Fokkers. The English boy was in the act of fixing a first field dressing upon a slight but rather gory flesh wound in his thigh, before diving for the further ground-strafting of hordes of German infantry, when he heard a tremendous rattle of machine-gun fire behind him.

Glancing over the tail of his machine he made the discovery that no fewer than three Fokkers were close behind and above him. They clearly held the advantage, in position as well as in numbers, and, recognising this painful fact, the boy resorted to a *ruse-de-guerre*, the inspiration of which may have come to him from his not very remote first history lessons at school.

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Flying along as though he had not seen them, he suddenly pitched forward in his seat, as if he had been shot, and simultaneously the nose of his machine went down, and it began to spin at break-neck speed toward the ground.

Two of the Fokkers, delighted with their easy victory, made off eastward immediately; but the third, full of kindly German kultur, no doubt, was anxious to make sure that the Englishman really was killed, and so followed down in a vertical dive, getting in an occasional burst of fire as opportunity offered.

At 500 feet, being quite sure that his victim could not possibly recover, the German began to flatten out, in order to get a good view of the crash.

This was exactly what the British boy had been waiting for. With a tremendous physical effort he pulled his machine out of the spin, and then got his nose up until she was practically standing on her tail, directly under the Fokker.

At the psychological moment, he fired with deadly precision into the very vitals of the German aeroplane, which crumpled up like a pack of cards. A cloud of black smoke burst forth from its engine, and when the final crash came only a smouldering heap of debris could be seen on the ground below; but the German had not seen the crash after all. We pass on to the crack pilot of this splendid squadron.

For "most conspicuous and consistent bravery from April 25 to May 5," Ball was awarded a posthumous V.C. On the evening of the seventh of May, he was brought down and killed in the German lines. So ended one of the most romantic careers of the war; so originated one of the most daring and lovable of warrior types of the great war. "Early great and early dead," Albert Ball heard his name in every mouth, and yet before he had touched manhood he was with the immortals. He was only twenty when he died. Three years earlier, at the outbreak of the war, he had volunteered immediately for active service. A schoolboy of seventeen years of age, and though of a nervous temperament, he succeeded in enlisting; and by February, 1916, had crossed the Channel bound on the great adventure. Thence on his success was meteoric.

In six months he achieved a record of 84 combats and 28 German machines brought down, and he had received the

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congratulations of Sir Douglas Haig for a battle with more than 20 Germans. In the words of an official report: "On returning with a damaged machine he had always to be restrained from immediately going out on another." In all Captain Ball destroyed 43 German aeroplanes and one balloon.

He was the "Scarlet Pimpernel" of the air, always hovering above the clouds ready to dive down to the rescue of British aircraft. Feared and respected by the enemy, it is interesting to note, as his personal letters revealed, Albert Ball was a quiet, reserved youth, inclined to be timid, certainly shy, while possessed of an inherent distaste for bloodshed. He always fought in a spirit of chivalry. "You ask me to let the devils have it when I fight," he wrote to his father from France. "Yes, I always let them have all I can, but really I don't think them devils. I only scrap them because it is my duty, but I do not think anything bad about the Hun. He is just a good chap with very little guts, trying to do his best. Nothing makes me feel more rotten than to see them go down, but you see it is either them or me, so I must do my best to make it a case of *them*."

Therein speaks the man; the natural instinct which found war abhorrent; the soul which could achieve the Olympian heights of daring, at the same time admitting the frail courage of the common man. He made a "rotten landing" when learning to fly, and was considered a nervous pupil without promise. "My instructor," he wrote, "came up and told me to get out, and advised me to look for a good flying school for girls and join it at once. He ended up with saying that he would never let me fly again. You may guess by this time I was getting a little ratty, and at last I told him a few things. I told him that as I had only had fifteen minutes of the S.H., he could not expect me even to fly them, let alone learn them."

Despite the animosity of this instructor, young Ball went out to France as a pilot. He first came into notice, and was awarded an M.C. when escorting a British bombing raid across the lines. On their homeward way they encountered four German battleplanes. Without hesitation Ball dived down into the midst of them, broke up their formation in hopeless disorder engaging hotly with the nearest enemy craft. The latter plunged earthwards wreathed in smoke and flame. Ball followed to

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within 500 feet of the mouth of the German guns, to make sure it was wrecked.

Within a few months he was promoted to Captain, awarded a D.S.O. and a bar, and then another bar, for "conspicuous gallantry and skill on many occasions, notably when, after failing to destroy an enemy kite-balloon with bombs, he returned for a fresh supply, went back, and brought it down in flames.

"He has done great execution among enemy aeroplanes," this report continued. "On one occasion he attacked six in one flight, forced down two and drove the others off. This occurred several times over the enemy's lines."

The Death of Albert Ball, V.C.

Ball was at his heyday a few days before he died. In ten days he had taken part in 26 combats in the air and destroyed eleven hostile aeroplanes, driven down two out of control, and forced several others to land. In these combats, on one occasion flying alone he fought six German planes, twice he fought five and once four. When leading two other British aeroplanes he attacked an enemy formation of eight, and on each of these occasions brought down at least one enemy. On the evening of May 7, 1917, he ascended with a patrol squadron of ten machines.

Near the lines they encountered a German machine, and riddling it with bullets, drove it down. Four red Albatros machines then came up, and a brother officer of Captain Ball engaged one of them at close range. The German manœuvred for a favourable position, and his opponent dived and shook him off. Climbing again, the pilot, who was the last to see Ball alive, pursued another of the red enemy squadron, and fought it for a considerable time, the German machine being outmanœuvred and sent crashing to the earth. When he turned for home again, Ball had disappeared from view. Last seen, at about eight o'clock he was not far over the enemy's lines and flying perfectly. The light then began to fail.

Major-General Trenchard, the G.O. commanding, in communicating the sad intelligence to his parents, paid a fine tribute to a fine career: "I very much regret having to tell you

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that your son, Captain Ball, is missing, but sincerely hope he has landed safely. As you know, he was the most daring, skilful and successful pilot the R.F.C. has ever had. Everybody in the Flying Corps has looked upon him as their own personal asset, and he was a most popular officer. His good spirit was infectious, as whichever squadron he was with the officers of it tried to work up to his level and reputation. I have never met a man who has been so successful as he was in such a short time, so modest, and so reliable."

The Great Month of May

Though in this month of great air fights the loss of Captain Ball was a very severe loss on the side of the British aviators, our airmen and gunners brought down no fewer than 243 enemy aircraft, or 73 more than in April, with losses fewer by sixty-one. The struggle for superiority in the air this month reached its maximum intensity. Seven hundred and thirteen aeroplanes in all were brought down on the Western battle front, which total was made up of 442 German machines, and, according to the claims of the enemy, 271 Allied craft. The British headquarters in France admitted that during May 86 British machines failed to return to their base. On the other hand, we destroyed 19 German machines; crashed 2; brought down (which, as in the case of the French, meant destroyed), 91; nine more fell in our lines; nine were brought down by our anti-aircraft guns; while 113 more were driven down out of control, and we claimed the finest aerial victory of the war.

Of the 199 German aeroplanes brought down by the French 80 were destroyed. "Their destruction," it was reported, "had been most strictly verified." The other 119 were driven down seriously damaged "and probably crashed to the ground in the enemy's lines." The Germans, who had never distinguished between airmen's and gunner's successes, of the 165 victories claimed, attributed 55 to airmen and gunfire; 37 were reported merely as "shot down," 12 as brought down by gunfire, and two "forced to land."

A personal feature of interest with regard to these enemy reports was the sudden disappearance of Cavalry Captain

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Baron von Richthofen. Richthofen had been sprung upon the public on February 15 as the victor of 21 air fights, and between that date and April 30 (on which day he was said to have brought down five enemy machines) he was reported to have accounted for 31 other aeroplanes. Since April 30, however, his name had not appeared once in the German reports. This curious disappearance, as was to be revealed by later records, was due to the fact that he had been seriously wounded in the greatest air battle which had yet been fought in the war.

This is the story of how five British aeroplanes fought 27 Germans and beat them, sending eight to earth crashing, crippled or in flames. It happened on May 5, a day of great heat and thick haze. Our men had started fairly late in the afternoon, and at five o'clock were well over in the enemy country, when, with the sun at their backs, they saw the enemy machines ahead.

A Battle of Some Consequence

The enemy flew in three formations, two of which contained eight machines, and the third contained nine, afterwards being joined by two reserve aeroplanes—von Bulow's circus; one of the two famous enemy mobile fighting squadrons of 24 to 30 crack pilots and machines apiece, which travelled from aerodrome to aerodrome, staying a week or so at each, for the purpose of making spectacular flights and instilling courage into the local flying men and impressing the infantry on the spot.

In the thick haze which prevailed, one of the enemy squadrons came on our little squadron from behind, as from the direction of our own lines, straight between it and the sun. "The fight began at about 11,000 feet," said the Special Correspondent of the *Times* in a message from the War Correspondents' Headquarters, dated May 8; "but in the course of the things that followed it ranged anywhere from 3,000 to 12,000, up and down the ladders of heaven. And an extraordinary fact is that, all the while that it went on, the German anti-aircraft guns below kept at work. Usually, as soon as aeroplanes engage overhead, the 'Archies' are silent for fear of hitting the wrong man; and whether the German gunners



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were drunk with excitement at what was going on above them, or whether it was that our machines formed so isolated and compact a mass in the heart of the great maelstrom that it seemed still possible to shoot at them in safety, is not known. At all events, the tumult in the skies was increased by the constant pumping into the tangled mass of shells from the ground.

"The actual fighting lasted for a full hour, from 5 to 6 o'clock, an extraordinary time for such a thing, and during all that hour our men fought tooth and nail. And the fight had lasted but a few minutes when we drew first blood, and an enemy machine which Captain A had attacked went down in flames, with the wings of one side shot away. Then it was Lieutenant B's turn. He caught his adversary at close range fairly, and the German aeroplane went down turning over and over as it fell straight down 11,000 feet, leaving a trail of smoke behind. Lieutenant C scored next, his enemy's machine spinning plump down to where, somewhere below the haze, it must have crashed.

"Then, for a moment, it seemed that our luck was turning. Lieutenant B's engine gave out and he was 'compelled to leave the formation.' It is a simple phrase, but what it means is that, helpless, and with engine still, the aeroplane dropped out of the fight from 11,000 feet down to 3,000 feet. It was a dizzy drop, and as he fell an enemy, seeing him defenceless and scenting easy prey, went after him.

"But other eyes were watching. Lieutenant C saw his crippled comrade slipping downward and saw the German dive after. Quick as a flash he followed, and before the German could do his work the British aeroplane was almost touching the tail of his machine, and in another second the German turned clean over in the air and then crashed nose foremost down into the abyss.

"Then, almost by a miracle, B's engine caught its breath again. Once more the machine was under control, and B, who was one of those who were new to the game, climbed and rejoined formation. Some 8,000 feet he had to climb, with the baffled 'Archies' blazing at him from below, up into the inverted Hell above, where his four comrades were fighting enemies who outnumbered them six to one. Just as he 're-

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joined' another German fell. It was A's second victim of the day, and friend and foe alike saw the machine go, sheeted in flames, down into the gulf.

"Then once again it seemed that a throw had gone against us, for, still under control but with flames bursting from its reserve petrol tank, one of our machines commenced to drop. Again an enemy, glimpsing an easy quarry, dived for the flaming ruin as it fell, but, quicker than he, A also dived, and while our crippled machine, still belching flames, slid off, with its nose for home, the German, mortally hit, dropped like a stone.

"It was just retribution. The unwritten laws of this marvellous game prescribe that no honourable fighter attacks an enemy in flames. Such an enemy is out of the fight, and has trouble enough for a brave man. The German who dived for our machine knew that he was doing an unchivalrous thing, and it may be that that knowledge unnerved him, so that he paid the penalty.

"Strangely enough, our burning aeroplane got home. I have seen the wreckage, with the reserve petrol tank on the roof bearing two bullet holes on one side and great ragged tears on the other, where the bullets passed out. The whole tank is scorched and crumpled. The flames had burned away the whole centre span of the upper plane. The thick rear main spar was charred and burned through, and two ribs were completely severed and hung with loose blackened ends. Yet, like a great blazing meteor, it crossed our lines and came to earth, not indeed at its own home, but on safe and friendly ground; and as another airman said to me in admiration, 'He made a perfectly topping landing.'

"Meanwhile, the wonderful flight was drawing to a close. The British pilot, Lieutenant D, emptied a belt from his machine-gun into an enemy when so close that his wings almost brushed the other's rudder; and the enemy turned turtle, clear over on his back, and, spurting out a thick column of black smoke, went down.

"Some of the enemy were already drawing off, but our men were in no mood to let them go. It is harder to get out of a losing fight than it is to begin it, and before the enemy mob

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could disentangle itself from the battle two more of their machines had gone to earth—one, his third in the fight, falling to Lieutenant C, and one to Lieutenant E.

"Then the last four of our machines, still lords of the air, came home.

"I have seen three of the machines, counted their bullets, fingered the cut wires, and seen the dents on spars and propeller blade; but what, I think, has amazed me most was the fact that yesterday morning four of the aeroplanes, with the same pilots and observers, had been out again. One had brought home with him some brand new scars from an anti-aircraft gun.

"The fame of the battle, of course, has spread, and the heroes have been flooded with congratulations. But for their own part they take it all as a bit of their day's work, and it has not interrupted the rhythmical routine and discipline of the aerodrome."

CHAPTER VI

CONTACT PATROLS AND BOMBERS

“Valuable Assistance was Given by Our Airmen”—The Bombers which Bombed—Moonless and Moonlight Raids—A Raid on Germany by Night—The Great Reprisal and other Raids—Bombing a German Bombing Machine.

DAWN was breaking on March 2 as an aeroplane left the ground; over the grey debris of the old city of Ypres; Zillebeke Pond and Hooze Wood to the south and east; over St. Jean, Frezenberg and Langemarck to the north-east. The morning mist was still hanging over the valleys and low-lying land. To the east, a rich glow announced the coming of the sun.

The Royal Air Force observer had other work than the enjoyment of these natural beauties. He was detailed for co-operation with the British infantry, who were to attack that sinister hillock on the north bank of the Ypres-Comines Canal.

As the machine approached the trenches, the observer noted the long line of vivid flashes, and over beyond the salient he could see bursts of flame which died down into clouds of black smoke, beyond Zillebeke. The British gunners were preparing the way for the infantry. The whole line was covered in smoke from the bursting shells, which were keeping the Germans in their dug-outs, and destroying their machine-gun emplacements and trench mortar positions.

At the appointed second, the curtain of fire advanced to the rear of the German front trenches, and then could be seen the little dark figures of the first wave of infantry going across No Man's Land to the assault. They were led by tanks lumbering over the shelled and pitted ground, with spurts of yellow flame shooting out from their guns. Then followed more waves of infantry in support.

The observer, flying low, made careful note of the new positions along the Canal on his photograph map. These, as

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well as messages received from the advanced troops, were taken by the aeroplane back to Headquarters.

Occasionally, the pilot and observer could hear the tat-tat-tat of German machine-guns firing at them from the trenches below, near Zillebeke. They were flying too low to be worried by "Archie."

Although busy watching the movements of the British infantry, the observer saw one concentration of German troops gathered in a sunken road near Zwartelen, not far behind the lines. He signalled his pilot, and, diving swiftly, they swept the enemy concentration with successive bursts of machine-gun fire causing many casualties. Then a signal to the field batteries brought shrapnel to complete their work. No counter-attack was launched on that Zillebeke sector.

Near by, the observer could see another British aeroplane spotting for the heavy guns, and for a few seconds he let his eyes wander from his own infantry, to watch the huge howitzer shells making volcanoes among the German batteries. It was a beautiful piece of work, and the observer smiled the sympathetic smile of the fellow craftsman who can appreciate a good thing when he sees it.

Then he turned again to the wiry tommies of the south-country battalions, and grimly bombed their way for them along a communication trench from the captured German first line into the second line.

A few minutes later he tapped out a message: "German second line taken."

Infantry co-operation, "contact" patrol, ground strafeing, one and all standing for the same, embody pretty well the movements outlined above. Co-operation with the infantry was nothing really new. It was a development in aerial combat. Previously, the battling airmen had influenced the actual battle situation to a less degree. Though he blinded the enemy's eyes before our infantry attack, drove off his artillery direction machines, to the added comfort of the troops on the ground, and kept off the German battleplanes from similar attacks on the British trenches, he was high in the air. "Contact" patrol was the same thing carried out at a lower altitude, more intimate, actually in contact with the advancing infantry.

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Before, during and after the battle the contact planes were busily at work, until evening : "just before dusk, the dusk of a golden day . . . an hour when all our aircraft fly home to roost after long journeys of adventure over the German lines, some of them with holes in their wings, and some with broken wires . . . these home-going flights, beautiful as swallows, as they skimmed high in the blue fields of the air above the white cloud mountains. All their engines sang in chorus in a steady vibrating drone, clear above the noise of the guns."

These were the aviators of whom Sir Douglas Haig ever and again reported : "Our aeroplanes did much valuable work in co-operation with our infantry. The enemy's troops were engaged successfully with machine-guns, and bombs were dropped on a number of places behind his lines." One day one of them engaged from a height of two-hundred feet a squadron of Pomeranian Hussars, killed about twenty of them, and dispersed the remainder ; from the same altitude, using his machine-gun upon a squad of 100 Germans who were unloading trucks in a railway station, with devastating results. On another, the pilot and observer of a squadron, a captain and a lieutenant respectively, pursued and twice dispersed two companies of Bavarian infantry, each 200 men strong.

Behind High Wood, on April 19, a "contact" pilot saved a group of British cavalry from destruction by their machine-guns. In the same area, German airmen, who had been active, thought it worth while to dive and attack with machine-gun fire two staff officers cycling forward for observation purposes ; both were rescued in the same manner.

The work of our planes was for the time finished, for the weather broke, steady rain set in at the dawn, following a night of howling wind and squalls, shrouding everything in a thick, November-like mist and robbing us of all the advantage of our air supremacy and observation. By this time we had the high ground commanding the battlefield and a mastery in the air hardly less complete than in the Battle of the Somme. Each day enemy machines made, perhaps, a dozen crossings of our lines, sometimes a few more, sometimes a few less, but, on an average, about a dozen, and every time a German machine came over it scurried back, just as hard as ever it knew how.

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In and since the Battle of Arras, alone, British aviators—many of them co-operating with the infantry attacks—made daily over 400 crossings of the enemy lines—not hasty dashes, but, as I have said, innumerable low-flying “contact” patrols, deliberate reconnaissances, with careful observation, taking thousands of photographs and making long-distance raids and excursions over German territory.

Upon April 21 occurred one of the most curious incidents of the battle—to an infantry co-operating machine. The Canadians, at a certain place, found in a dug-out two British airmen, who had been captured five days before. One of them had been wounded, and the other was put with him in the dug-out to look after him. Together with other things, they seemed to have been forgotten in the enemy’s flight, and were now safe again. At sunset another day—April 24—came other British “contact” machines, the crews of which, as Mr. Gibbs said, “had earned their rest but did not take it. They saw the fighting down below—in the valley of Cojeul River below Guemappe—the British troops advancing in open order, and the Germans coming out to meet them. They stopped on their homeward flight, stooped low and circled round like hawks, dropping the last of their ammunition and sweeping the enemy’s positions with a swish of machine-gun bullets. The men of the air fought with the men of the earth in the glow of the sunset light, which was rich and warm over these battlefields.”

The Bombers which Bombed

When over Vimy Ridge the British sprung the great mines before a wide-flung infantry attack, when General Mercer and Colonel Buller of the Princess Patricia’s were slain in the heroic Canadian stand amidst the tangled undergrowth of Sanctuary Wood, the reconnaissance pilots sweeping far out beyond the enemy lines and the “contact” machines sweeping down with their machine-guns and bombs on the massed infantry behind Bellevaarde Beke, far and wide behind the enemy trenches, incessant and relentless, continued the least advertised and most valuable preparatory work in the battle—that of the aerial bombers. The arm that gleaned that necessary information concerning the enemy’s movements was at the

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same time the mailed fist which hit the German straight between the eyes; blinding, stunning, sweeping his legs away from under him, as one by one his vital lines of communication were blown sky-high behind the track of his advancing armies; his ammunition dumps, railway junctions and headquarters reduced to heaps of debris.

In this respect the Flying Corps was more than a self-contained unit. Not alone did they seek out their own objectives, but immediately after went out and destroyed those same objectives from the air. Of course the Germans did the same thing, but their methods suffered greatly by comparison.

The enemy had no sense of humour, and here is proof to the statement. Said the *Cologne Gazette*, later this year: "On the first air-raid on London in July, 1917, Lloyd George said that England would not reply in kind, as attacks on defenceless people were contrary to the national character. To-day attacks of this kind form an important part of England's programme and are openly boasted of." Curiously enough, the *Cologne Gazette* overlooked the instance of their own raids earlier in the war on English towns outside the war area.

Assuming that British bombing methods were the same as German, it is worth pointing out that the *Cologne Gazette* is here reproaching hated England for descending to the level of beloved Germany. It is very singular, this complete lack of any sense of humour.

British methods in bombing, as in other matters, were essentially different from German methods. Despite the overwhelming provocation she had received, Britain was not replying "in kind" to the indiscriminate German attacks on defenceless people. Britain was attacking, first, that most legitimate of targets, the German Army, and secondly, the Rhineland supply establishments of the German Army, with machines fitted with scientific bombing sights.

The whole of the Rhine area in due course was subjected to aerial photographic reconnaissance, and the bomber's maps, made from photographs and constantly revised to date, were an exact guide to his objectives of military importance. Germany did not trouble herself with preliminary reconnaissance before attacking London. London in the large part was her

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target, not any particular munition or administrative building, but London at haphazard bombed by night to emphasise the blind malignity.

To reply to Germany "in kind" Britain would have had to bomb and machine-gun German hospitals, her airmen harass by machine-gun fire doctors and nurses in their merciful work of carrying helpless wounded men from burning buildings. And it would have been difficult because there were no British airmen who, by any means, could have been coerced into doing work of this sort.

Then she would have had to think out infamies to equal those of German submarine commanders who, having deliberately torpedoed hospital ships, shelled open boats and butchered women escaping in them. In short, she would need to have perpetrated a hundred and one savageries which no Englishman to-day could have been hired to carry out on any terms at all.

Whichever way you look at it, it seems that the British bombing campaign was not only justified but belated. Apparently this also was the view held by the British air commanders, for our airmen henceforth raided the unhappy enemy day and night incessantly. Almost at any hour of the twenty-four our heavy bombers could be seen ploughing their way across the agate blue sky-line, their high path flecked by murderous white-flame shrapnel bursts. Not that they seemed aware of the fact, as, calmly ignoring these enemy attentions, they continued steadfastly on their way to their objective.

The nature of these punitive expeditions varied considerably. There were out-and-out reprisal raids, as that of April 14 on Freiburg. There were day and night raids, and tactical and strategical missions.

Where the objective of the aviators came within the scope of the commander with whose army they were co-operating, as raids on the enemy front-line or reserve trenches, headquarters, dumps and railway junctions immediately behind his lines, the results may be classified as tactical. Strategical air operations were those directed against points of military importance well back—twenty, thirty, a hundred miles—in the enemy country. The objectives in this case were positions which influenced, not

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one particular sector of the fighting front, but the whole line from the Juras to the North Sea.

It was the German who initiated the fashion of night raids, but the Allies who developed it until it became an important section of the work of the Flying Corps. Again they developed types of night work—moonless and moonlight operations. The working month of the British night bombing squadron was divided up into two periods, which were known as Light and Dark.

Moonless and Moonlight Raids

As its name implied the Light period covered the moonlit half of the month, and should that be attended by fine weather, great aerial activity prevailed.

Practically any raid that was possible by day, could be carried out equally well at night during the period, January to May, when the moon is highest, for although certain details were not visible, the essential features of the ground stood out clearly and could easily be followed. Thus it was not necessary to steer a course entirely by the aid of a compass, and indeed the compass was only employed for checking purposes.

The ease with which targets could be found depended very largely on their geographical position. Water was the great guide for night flying, for on a clear moonlight night it could be seen from a great distance. Hence objectives situated near a river, canal or lake, were much more readily located.

Railways, too, if they were in use, proved excellent guides, for the unrudded rails shone clearly in the moonlight and could easily be followed.

Woods, especially if they were of a peculiar shape, made good landmarks, for the black mass, which showed up well in the moonlight could be quickly identified on the map.

Naturally, during the Light period all the long raids of a squadron were carried out, for there were very few targets indeed that, not situated near a river or railway, could not be found by taking a bearing from some definite landmark.

The Dark period, or the period of moonless nights, was a much less active time. Flying was then chiefly done by the aid

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of the compass; although on cloudy nights, raids on targets such as factories with chimneys or blast furnaces, the glow of which lighted up the sky and could be seen for miles, might be carried out without complete reliance on the compass.

Raids on moonless nights were usually short, for flying by compass was not altogether satisfactory. Given a still night a compass course could be flown quite accurately, but unfortunately there were comparatively few nights on which the wind remained constant. It either increased in velocity or changed direction, and since in the air it was difficult to distinguish these changes, a machine was very liable to be blown out of its course, without the pilot's knowledge.

Only short raids therefore were undertaken in this period, and the risks of pilots losing their bearings was minimised as far as possible. Oftentimes two or three short raids were carried out in one night.

A Raid on Germany by Night

On the results of the bombing expeditions carried out on the night of April 18, it was reported by the British Commander-in-Chief that, "our aeroplanes obtained hits upon an enemy train, two hostile columns of mechanical transport, a German transport park and munition works in a Rhine town."

Some eight hours previous to this raid a British observer settled himself beside a pilot in a big bombing machine. The signal was given, and the machine moved forward, turned into the wind, and rushed across the grass into the dim night.

It climbed swiftly in wide circles, and below could be seen the dim countryside where a few scattered lights twinkled. Far to the right lay a winding river, like a thread of silver ribbon. Beside that silver ribbon, nearly two hundred miles away, lay the German town which formed this night's objective.

In front of the two airmen glowed the phosphorescent dials of the recording instruments. Soon they registered sufficient height for the machine to turn towards the fighting line, up and down which great white star shells were rising, to hang suspended for a few moments before fading out into the darkness.

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The wing-lights were switched off, the lines were crossed, and friendly territory left farther and farther behind.

Far ahead the glare of many blast furnaces could be seen and above them the long, white fingers of German searchlights swept restlessly to and fro.

The British machine flew on steadily, vainly sought for by the searchlights, and unscathed by the fierce barrage of shells which burst thickly far below them.

Soon the first barrier of defence was passed, and for a long time they flew over mile upon mile of enemy territory, over dim-lit towns and sleeping villages and fields. The British airmen passed a big city lying on the bank of the river. They could see the bridges, black across the band of silver, and over the city swept three long searchlights. Still they flew on, leaving the city far behind. On either side the engines roared steadily. Behind them hung in readiness their yellow bombs.

When they had been flying over German territory for over two hours, they saw ahead of them on the river the lights of another big city. This was their objective, and at once the machine swept round towards it.

The observer crawled into the back, and lying face down, opened the sliding door in the floor of the machine. Below him a square mile of moonlit country, on which he could see a little scattered village and the edge of a forest. And then the twisting river came into his view. He leaned his head out of the hole, and saw the black mass of the town a little ahead of the machine.

Already he had noticed the dark line of the railway running into the city. The pilot steered the machine round, by the observer's directions so that it might follow the railway, and so find surely the great railway junction that was to be the target for his bombs.

Two searchlights had now sprung up, and here and there in the sky burst a few random shells. He could see the puffs of smoke, white in the moonlight, drift by beneath him.

They ignored the searchlights and flew steadily on with engines roaring. The big city twinkling with hundreds of carefully shaded lights lay spread now below the observer's

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peep-hole. The fore-and-aft bar of the bomb-sight drew near the station, and touched it. The observer's hand reached out to the bomb-release at his side.

The luminous range bars crossed the edge of the junction. He pushed the lever hard over, drew it back, and pushed it over again and again. Below he could see for a moment the fat bombs spinning down towards the railway junction.

The British observer looked down intently to the black triangular mass of the railway junction, with its crowded sidings. A great spurt of red flame leapt up at its edge, as the first bomb exploded. Then another followed it, right in the junction. Then another, and yet another. The fifth caused a tremendous explosion followed by blinding white flames—acres of it. Clearly an ammunition train had been hit.

Then the others burst, one after another, leaving the railway junction shrouded in moonlit smoke through which the red light of a growing fire glared dully.

He climbed up beside the pilot and told him to turn. The searchlights erratically swept to and fro, with every suggestion of panic, fear, or lack of skill. The airmen laughed at them, and sweeping round, started on the long homeward journey.

British aviators were apt at this time frequently to break away from their routine missions. It was the enemy guns they went after, groups of anti-aircraft batteries, considerable damage being achieved in these innumerable unofficial attacks. From the beginning of our offensive in early April, the Germans had rushed up innumerable anti-aircraft batteries to the Western Front in an effort to check the care-free manner with which our bombers time and again went gaily sweeping over their lines, and sometimes swooping down to within effective range of their trenches.

One day, in the middle of April, three British bombing machines flew along the main street of Lens on a level with the roofs and liberally bombed a regiment of Bavarian infantry which was marching with swinging stride on the road of retreat. Another, a squadron, annoyed by the too-constant attentions of a certain group of German anti-aircraft guns, flew up in the middle of the afternoon, drew the fire of the

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battery, then closed upon it and let go with 124 bombs. There is no need to record what happened to that battery.

Within a fortnight, April 14 to 24, occurred three events of especial interest with the bombers. Fine weather on the 24th enabled our men to carry out many useful raids. Bombs were dropped effectively upon the enemy's railway junctions, aerodromes, billets, and ammunition dumps. In one of these raids a large bomb struck the engine of a moving train, blowing the engine off the line and wrecking the train.

A Great Reprisal Raid

At noon on April 14, according to a message sent through the wireless stations of the German Government, "a hostile squadron composed of 12 aeroplanes attacked the open town of Freiburg. The attack was repeated at 5 p.m. by two more squadrons, with altogether 23 machines. Several human lives were sacrificed to the (sic) iniquitous attack; 7 women, 3 men and 1 soldier were killed; 17 women, 8 men and 2 children were wounded. The hostile fliers also aimed at the new theatre, the university and the clinics. The anatomy section was considerably damaged. The attack was not fully carried out, thanks to our efficient counter-measures. During air combats with our defensive fliers two hostile machines were shot down near Schletstadt and Markich. A third fell down in air combat with the assistance of anti-aircraft guns. It is characteristic that the three machines brought down were British, with British crews.

"The commander of the attack, a British Lieut.-Col., fell into our hands. According to his declaration and to the text of a pamphlet dropped, the attack was a reprisal for the torpedoing of the 'Gloucester Castle.' The justification of such a foundation is most categorically contested. Our Government communicated in time to England that the plying of so-called hospital ships could not be further tolerated within the exactly delineated zone. If the British nevertheless do not heed our warning and misuse the Red Cross and undertake transports in the barred zone, they must bear the consequences of the proceeding. It is cheap glory to attack open towns for ven-

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geance. At Freiburg there are no objects of military importance which could justify this attack, which is thus a worthy successor of other attacks against defenceless villages in southern Germany, which are not justified by anything and are a sad parallel to the assassination of children at Karlsruhe on June 22 last year."

Bombing a German Bombing Machine

On their homeward way from Freiburg the observer of one of the big British machines noticed marked activity at a German aerodrome which lay near his pilot's course.

Landing lights were burning on the ground and signal flares were being fired from machines in the air and from the aerodrome. The observer pointed this out to his pilot, and suggested that one or two of the fourteen bombs they were still carrying—they had been a reserve machine in the grand attack—might be used with advantage over this German aerodrome.

The pilot agreed and the observer climbed into the nose of the machine and steered with gestures of his hand directly towards the aerodrome. They drew nearer and nearer and still the roaring of their engine was unchecked. The Germans must have heard them, but evidently thought that a German machine was returning from a raid.

The British airmen realised this, and made no attempt to disguise their approach. The observer could now see distinctly the hangars in the moonlight, and the aerodrome itself with little twinkling line of landing lights on it. He could not decide at first where to drop his bombs; there were so many good "targets."

Even as he looked down, however, he saw over the trees on the left of the aerodrome a great light appear, and fade away, followed by another and another. They were being fired by the observer of a machine landing, in order to light up the ground ahead of it. Each light threw a big shadow of the aeroplane across the ground, as though a ghostly machine of enormous size was escorting it home.

The observer intently watched the progress of the machine, whose position he could tell by a light on the top of its

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plane. He saw it glide slowly across the grass, touch the ground, bump slightly, roll along and stop.

He steered his pilot a little to the right, and the "direction-bar" of his bomb-sight slowly swung round and crossed the little red light on the ground beneath. At once then, he held up his hand, and the machine stopped turning and flew straight ahead. Gradually the little bar crept forward to the red light. The "range-bars" crossed it, and the observer pushed his bomb-lever sharply forward.

He heard two clicks behind him as two great yellow bombs dropped out of the machine into the night.

The machine flew on, and after what seemed an age, and was but a few seconds, a great burst of flame appeared right over the little red light, and then another a little ahead of it.

CHAPTER VII

PHOTOGRAPHY FROM THE AIR

Some Photographic Patrols—The New Arm of the Air War—Aerophotography—A Personal Anecdote—School of Aerial Photography—Mobile Laboratories and Dark-rooms—Reading the Air Pictures—Overlaps and Mosaics—Submarine Patrols and Bomb Raids—North Sea Patrols—Adventures of a Sopwith Machine—New Traditions of Aviation—Co-operation with the R.F.C.

It is not generally known that the new British Navy—I am speaking now of the lately reorganised naval flying service, the Royal Naval Air Service—first distinguished itself as photographer extraordinary to the British forces operating along the Belgian coast in 1917. No other photographer of the war, amateur or professional, could excel the work of the Navy flier in this respect. Scarcely a spadeful of earth could be turned over, hardly a trowel of cement added to a German bastion along the coast, but a note appeared a day or two later upon the long chart which adorned the record office of this particular naval air squadron. A crumpled escorting machine might have come down out of the clouds, eddying like a withered leaf, to crash somewhere behind the German lines; there might be somewhere near the shore a broken young body in goggles and leather lying amid the wreckage of his last flight. Such was the price paid for a few more dots added in red ink to a couple of feet of chart. But as long as the photographic machine returned with the camera intact the price was paid ungrudgingly.

Curiously enough, this photographic activity was a later development. The Navy had wanted someone to direct the flight of their heavy shells, which were just beginning to feel out the positions of the enemy inshore batteries; the R.N.A.S. photographer was the outcome of this want.

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To do so successfully called for a great sacrifice on the part of the naval flier. He had to sacrifice his historic and traditional blue uniform for drab khaki. This he did with a smile—as duty demanded—but everywhere he settled ashore the true naval spirit preceded and outlived him. The naval airmen garbed themselves, in due course, with khaki uniforms, but retained the executive ring and curl on their sleeves, and their naval caps (with the eagle's wings in place of the crown and anchor on the badge), *plus* a hated khaki cap-cover. Wherever their squadrons were based they rigged a flagstaff and flew the White Ensign at the peak. They erected wooden huts and painted them Service grey, labelling them "Mess-deck," "Wardroom," "Gun-room," as the case might be.

They divided the flights into port and starboard watches, and solemnly asked leave to "go ashore" for recreation. Those who strayed from the stern paths of duty suffered the same punishments as the Navy-that-Floats. And at the conclusion of each day's work the Wardroom dined, and drank to their King, sitting, according to the custom and tradition of the naval service.

They soon began to prove of great value to the parent body at sea. Apart, however, from innumerable spotting duties, aerial combats, bomb raids, reconnaissance raids and so on, the R.N.A.S. undertook a photographic reconnaissance of the entire Belgian coast from Nieuport to the Dutch frontier. The work in progress at Ostend and Zeebrugge, the activities of submarines and destroyers inside the basins; locks, quays, and gun-emplacements, and the results of bombs dropped thereon the night before were all faithfully recorded by those aerial cameras. Thus the question naturally arises, was the camera a more deadly aerial weapon in the air than the machine-gun?

The query is neither so startling as at first sight it would appear; nor is it an attempt to enter upon any paradoxical controversy; but merely a carefully studied comparison of values.

About this time—spring, 1917—there appeared in the British Press official Admiralty pictures of the aerial bombardment of Bruges and Zeebrugge; smudged, scarred reproduc-

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tions, pocked with dull jagged markings where British bombs had found their mark.

Nothing more inspiring to British public opinion could have been imagined than this undeniable witness of the activities of British airmen. But the original activities were not shown; that spade work of the photographers, working, possibly days, weeks, or months, before the raid; supplying M.I.—Military Intelligence—and the bombing pilots with the accurate, detailed survey of the district on which they were to operate. A comparison between these two sets of pictures would have clinched the argument outright. As it is we must pass on to further facts; to the photographic negative that revealed the position of the big German howitzer which had shelled Dunkirk so disastrously in the earlier days of the war. For some weeks our Intelligence people had been waiting for that information. Within three days that particular gun had been silenced. Artillery or infantry, retreat or advance, neither could be hidden from that prying eye of the heavens that never made a mistake, never forgot, never lied. There is an instance on record of a German advance under cover of a heavy early-morning mist. The wily enemy had banked on this to get his reserves up unnoticed. And all would have gone well had not the daring pilot of a British photographic machine intervened. Though cleverly the Germans had attempted to camouflage their men in special uniforms; the eye of the camera and the colour sensitive plate was proof against all such arts. In fact, it was the camera that furnished the first practicable basis to camouflage—the lesson that the shadow was the all-important thing; that the object one wished to conceal must not cast a shadow.

Aerophotography

A striking instance in this respect was the case of a French town long held by the enemy. Allied artillery months before had rendered it untenable by constant bombardment. Hardly a building was left standing intact, when one day it was discovered that one of the battered houses had suddenly sprung a roof. About the same time a certain roadway behind our lines came under the daily, almost hourly attention of an

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unlocated German gun. Heads were put together, and by a brilliant stroke of deduction it was discovered that the new roof concealed this same new troublesome visitor. Naturally, this particular "stunt" was not carried out without considerable risk.

The aerophotography pilot's job, however, was always somewhat of the "do or die" order. It was a point of honour that the flight got its "snaps," even if every available machine was sacrificed in the attempt. And then, undoubtedly, some other "photo" flights would have carried on. If one man went out and did not in due course return, another immediately followed him; if he were lost, there followed a third, and so on. Perhaps the last man might pass over the wreck of one of his companion's machines, a tragic little spot of grey, far below. I have seen photographs of that first man's wrecked plane taken by the last pilot as he passed over it. You see, it was not a pleasant occupation by any means. And sometimes, often single-handed, the photographer was forced to fight his way home against overwhelming numbers.

Tales of the "Photo-buses"

So it was one spring evening in 1917, when a photography-bound pilot went out with an escort of five fighting-scouts to snap a sector far behind the enemy lines. Barely had the observer set to work, and was already crouched in his shallow cock-pit, when "rat-tat-tat," barked a machine-gun somewhere near at hand. He glanced up hurriedly to find half a score of Huns bearing down upon them. For a brief moment he hesitated. Then the British scouts came into action, and, between whiles, the observer snapped his pictures. He had come to the last but one of his plates when the machine began to rock violently from side to side. It was a signal that did not take him moments to understand. They were attacked. He sprang to his machine-gun, and after a desperate, if short-lived, fight, the enemy was driven off. The observer then calmly took his two remaining pictures, and they turned for home. If it was one maxim that "The aeroplane was the eye of the Army," it was another that "The photographic plate was the pupil of that eye."

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One homing photographer recorded of such an adventure at 12,000 feet in the clouds a story in some dozen lines of an official report, which happened in 'as many minutes, which is an epic: "While exposing six plates, observed five H.A.'s—hostile aircraft—cruising. Not having seen any escort since turning inland, pilot prepared to return. Enemy separated, one taking up position above tail and one ahead. The other three glided towards us on port side"—a touch of the Navy that—"firing as they came.

"The two diving machines fired over 100 rounds, hitting pilot in shoulder." As a matter of sober fact, the bullet entered his shoulder from above and behind, breaking his left collar-bone, and emerged just above his heart, tearing a jagged rent down his breast. Both his feet furthermore were pierced with bullets, but the observer was not concerned with petty detail.

"Observer held fire until H.A. diving on tail was within five yards." The pilot of the H.A., having swooped to within speaking distance, pushed up his goggles and laughed triumphantly as he took his sight for the shot that was to end the fight. But the British observer had his own idea of how the fight should end.

"Then shot one tray into pilot's face," he says with curt relish, "and watched him stall, sideslip, and go spinning earthward in a trail of smoke."

He then turned his attention to his own pilot. The British machine was barely under control, but as the observer rose in his seat to investigate, the foremost gun fired, and the aggressor ahead went out of control, and dived nose first in hopeless spirals. Suspecting that his mate was badly wounded, in spite of this achievement, the observer swung one leg over the side of the fuselage and climbed out on to the wing—figure for the moment the air-pressure on his body during this gymnastic feat—until he was beside the pilot, who, faint and drenched with blood, had nevertheless got his machine back into complete control.

"Get back, you ass," he said through white lips, in response to enquiries as to how he felt. The ass got back the way he came, and looked back for the remainder of the H.A.'s. These,

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however, appeared to have lost stomach for further fighting, and fled. The riddled machine returned home at 100 knots, while the observer, having nothing better to do, continued to take photographs. "The pilot, though wounded, made a perfect landing," the report concluded.

Some time in the earlier days of the war the French and the British—the naval later co-operated with the military fliers in this matter of aerophotography—had been working together in a local advance. Certain dangerous obstacles had been anticipated in the ground to be covered, and the problem was: How were these obstacles to be located? Our commanders were still debating on this point, and the hour previous to the attack arrived, when the French came upon the scene with an aerial photo of this very area. Such a thing was regarded, if not as a freak, at least as a curiosity in those days; and particularly the queer black blobs on the negative that were supposed to denote barbed-wire entanglements. The British were dubious but, in due course, the attack went forward. And in due course the accuracy of the photography markings was ascertained. We considered the matter. It was a small seed that was to blossom into a rich harvest.

Before the war attempts which had been made with hand cameras strapped to the base of the fuselage proved dismal failures. However, a small but thoroughly efficient section of the Royal Engineers attached to the original British Expeditionary Force achieved some measure of success with ground photography. The work was often difficult and dangerous, necessitating unpleasant trips up into the firing line, and even out into No Man's Land. The operators often barely escaped with their lives, but they got their pictures, clearly-marked panoramic views of the enemy trenches that ensured the saving of many valuable moments, and yet more valuable lives in the ensuing infantry attack. At last their work began to be recognised by the people higher up. Then occurred the matter of the French aerophotography. And early in 1915 the central school of Aerial Photography was established, attached to the R.F.C.—the R.N.A.S. learnt most of their aerial photography at Dunkirk.

Starting in the humblest fashion, the whole-hearted effort

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of two men, housed in two large disused plane packing-cases, the school soon numbered hundreds and developed into an up-to-date scientific institution, equipped with every modern device and latest appliance. In the model dark-rooms every candidate for acceptance as a R.A.F. photographer had first to pass a severe practical test, designed to reveal his suitability, or otherwise, for the work. He was then given a month's practical intensive training, particular attention being paid to the process of development, and to the enlargement of negatives by artificial light. Much importance was attached to the rapidity with which these enlargements could be produced, for the fate of a battle often depended upon the promptness with which large-scale copies of a vital subject could be supplied the Intelligence Staff.

The School of Aerial Photography

The student was also carefully trained in the principles of colour photography, lantern-slide making, the production of stereoscopic mosaic photographs, the rapid drying and finishing of prints, map reading and plotting, and a host of other subjects indispensable to the practice of aerial photography at the Front.

The airman photographer then went to a Service Squadron overseas, where he was assigned to a photographic section working with a Reconnaissance Flight. Such a "section" usually consisted of a technical non-commissioned officer, and about seven men, who took it in turns to do the more confined and laborious aspects of the work. One man would "load" the magazines with unexposed plates, another would fix the cameras to the machines prior to flight, and receive them on return, others were detailed for developing, washing, drying, and plotting the negatives. Several men were constantly engaged in the enlarging room, exposing and developing as many as 100 prints in an hour.

But this was only the alphabet work of aerophotography. There were in addition to be considered special cameras, special lenses, special plates, special laboratories, and special methods. The R.A.F. camera itself was a solidly constructed instrument, quite unlike its popular counterpart, and, so far as the more

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modern types were concerned, resembling a gun rather than an optical apparatus. The lens was heavily shielded in a deep tube, to prevent sunlight falling upon it. At the other end of the "gun" was a steel chamber, containing the automatic devices for changing the plates after each exposure. The entire apparatus was securely fastened to the side of the machine and was connected by a wire with the observer's seat. The pressure of a lever was sufficient to expose a plate, and to bring a new plate into position.

There were authorities on lenses, magnification, telephotography, and light aberration. There were mobile dark-rooms on motor lorries, run by special technical experts attached to each aerodrome. Aerophotography was a fine art.

Reading the Air Pictures

Photographic reconnaissance differed little in either the naval or the military airmen's sector of the lines. The photo negatives were developed and printed, the resultant bird-pictures enlarged, studied through stereoscopic lenses, and, in the case of the R.N.A.S., finally given to the monitors for "information and guidance." Since it was not given to everyone to recognise the entrance to a dug-out or a group of search-lights as they appeared from a height of 20,000 feet, these photographs were embellished with explanatory notes for the benefit of anyone unaccustomed to such unfamiliar aspects of creation.

The price paid to obtain these negatives was not light. Out went the photographic planes, swooping low over the lines, where the enemy anti-aircraft gunners plastered the intruders with bursting shrapnel, and from every aerodrome German machines rose like a cloud of angry hornets to give battle.

Yet day after day fresh plates found their way to the developing trays, and a comparison between the official reports of the fights, couched in a laconic terseness of phrase that was good to read, gave perhaps the truest measure of the work performed by these very gallant gentlemen.

The case of Captain X—— is given as an example. Day after day, and for over a fortnight, in the same sector of the

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German "back-areas," Captain X—— carried out a detailed photography of a certain wide area, from which the staff anticipated an enemy drive. Under constant anti-aircraft bombardment, and at his own request working single-handed, he snapped every yard of the country over an area of many square miles; and was responsible primarily for turning what might have been an inglorious reverse into the capture of valuable German positions and a British advance of over a mile. Meanwhile, as X—— was at work in the air, his men were busy developing and printing the negatives and turning them over to the Intelligence Service. Thus commenced a brilliant series of deductions.

"Reading" the aerial photograph possessed a real flavour of the exploits of Sherlock Holmes. Minute, almost imperceptible details, overlooked by the amateur, conveyed to the trained eye a wealth of meaning. Spots, scratches, blurs, blobs, scientifically handled revealed the most unexpected details. The scratch might be a pathway leading to a new and unlocated enemy gun position; this blur the gun itself; the blobs, perhaps, a large rest-camp, or an ammunition "park." Turning the pictures over one saw first the beginning, then the progress of the work, then its completion, then the putting on of the camouflage. In one photograph half the camouflage was on. In the next it was all in place and the position of the work was indicated only by what looked like a faint blur. The next photograph showed directly over the completed work, a white spot like a ragged ball of cotton or the mark of a blemish on the negative—where a British bomb had found a target. The camera observer never made a mistake.

Instead of the quick unfocused impression gathered by the human observer while flying, perhaps under fire, the camera made a permanent record which might be studied at leisure in a place of safety. Instead of seeing one thing as the eye does, and then jumping to another thing, the camera's eye took in impartially every detail that came within its range of vision. As a comparison of respective reliabilities, the following incident serves to indicate on which side the balance lay.

An observer, returning from a flight back of the German

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lines at a time when gas was being used, reported four gas tanks at a certain place. A photograph a few minutes later, however, revealed the supposed gas tanks as harmless logs of wood. That was where the camera scored.

It was accurate to the *n*th degree, so accurate in fact that aerophotography soon almost entirely replaced the older art of map-making. Contours were not shown, but what was more essential, where the map was often five or ten years old, the plate was up-to-date to the moment; where the one revealed only roads, railways, rivers, towns and villages, the other supplied the additional—and most valuable—information, the precise locality of every enemy position, gun, and concentration in that area. Square by square, mile by mile, negative by negative, the work of the aerophotographer was pieced together by the staff in one huge plan.

Overlaps and Mosaics

Probably the most useful forms of aerial photography were those known technically as “overlaps” and “mosaics.” An “overlap” was a series of photographs taken from an aeroplane at regular intervals of a few seconds, so that each photograph overlapped the preceding one, thus forming a continuous strip photograph of the ground flown over. Further strips were taken so that their sides overlapped the first, and the result, when pieced up, was a photographic map. These photographic maps were known as “mosaics”—from the patchwork appearance the fields and hedges usually presented—and could be produced to any desired scale.

Aerial photographs taken to give a plan view of the ground were known as “verticals,” and according to the lens used they could be made to include practically any desired angle of view from any given height. For instance, at 1,000 feet with a 10-inch lens, the image of an object 500 feet long on the ground would just find a 5-inch plate. If, still at 1,000 feet, a 5-inch lens was used the image of the same object would only occupy $2\frac{1}{2}$ inches on the plate.

For military purposes the majority of aerial photographs were “verticals,” but great use was also made of “obliques.” Oblique photographs were generally taken at an angle of 11

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degrees under the horizontal, the resulting picture being in the nature of a side elevation of the object photographed. These indicated to the artillery and others the contours of the ground in front and the general lie of the land.

A British major, a pre-war scientific expert in matters photographic, went out one day to get some "obliques" of a vital point in the German "back-areas." He had been specially chosen for the job by reason of his previous qualifications; because of the intense value these particular negatives would serve. But misfortune dogged his footsteps all the time. The machine was started on immediately after crossing the lines, was caught by an "Archie" burst that smashed his camera and wounded him in the left arm. A second venture proved no more successful. The machine developed engine trouble almost immediately he took the air. But still undaunted he flew off on a third, snapped his photographs, and was set upon by a couple of enemy scouts. By a cool piece of daring he drove off his assailants. But, before he was able to clear himself, he had again been wounded; and again in the left arm. He suffered agonies of pain. Most men under such conditions would have landed at the first available spot within our lines. But not so with the Major. Realising the value and urgency of those exposed plates in the camera by his side, weak and faint from loss of blood, he kept right on to his own aerodrome, and made a perfect landing. Then he handed in his plates and fainted away.

Submarine Patrols and Bomb Raids

It must not be imagined by the reader that the main duty of the R.N.A.S. pilots was aerophotography. A great deal of space has been given to the subject, because it was a most important branch of the aviator's work in the war, both naval and military. The pilots and observers of the Naval Air Service had their fingers in many other pies. They fought—and drove down and off innumerable enemy machines from the skies; they co-operated with the R.F.C. with enormous success, having several fighting squadrons on the Western Front, chiefly at the left of the British line, many of them composed of the famous Sopwith machines. In the intervals they

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indulged in anti-submarine patrols, at lengthy intervals scouting far out over the North Sea; and they bombed—to be more strictly accurate they made a business of bombing.

Barely a day or a night passed by without they paid visits to the German positions along the Belgian coast, or farther inland, or down in the south where they were co-operating with the bombers of the R.F.C. They bombed Bruges harbour time and time again, Ghistelles aerodrome on not a few occasions, Brebach, in Saarbrucken, and the Zeppelin sheds near Tondern, Freiburg, on the Rhine, and Blankenberghe and Zeebrugge, the German lines in Flanders and Ostend. Briefly their Spring activities can be tabulated as follows:

<i>Date</i>	<i>Objective</i>	<i>Result</i>
Feb. 2	Bruges harbour.	Heavy bombs dropped on torpedo craft.
„ 8	Ghistelles aerodrome.	Large number of bombs dropped.
„ 8	Bruges harbour.	Large fires caused.
„ 14	Bruges.	Many bombs dropped.
„ 12	Saarbrucken.	Factories bombed.
„ 16	Ghistelles aerodrome.	Heavy bombs dropped.
„ 16	Bruges.	Shipping in harbour attacked.
„ 25	Saarbrucken.	Bombs on ironworks.
Mar. 4	Brebach.	Number of heavy bombs dropped.
April 8	Zeebrugge.	Many bombs dropped.
„ 8	Ghent and Bruges.	Ammunition dumps.
„ 17	Freiburg.	Town bombarded.
„ 23	North Sea.	Raid on German destroyers.
May 12	Zeebrugge.	Attacks on German aircraft.
June 1	Ostend, Zeebrugge, and Bruges.	Many tons bombs dropped
„ 2	St. Denis Westrem.	Aerodrome bombed.
„ 3	Bruges dock and canal.	Many bombs dropped.

During the attack on Bruges harbour on February 2, despite the intense cold, the British pilots succeeded in dropping innumerable bombs on torpedo craft in the harbour, while several buildings in the docks were set on fire. On the

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authority of a neutral, a Spaniard who had been living in Saarbrücken for a number of years, and arrived about this time in Zurich, French and British naval aircraft had made eight night raids on Saarbrücken by the end of February, 1917.

"I went through them all," he said, "but the first was the most terrifying, for the bombs fell in various parts of the town, causing a great panic and killing and wounding large numbers of people. Sirens were sounded to announce the second raid, which made matters worse, for the town was in a panic before the enemy arrived. As a matter of fact, on that occasion, and in all the later attacks, the town was not bombarded, only the blast furnaces at Burbach (a suburb) were attacked.

"Judging by the numbers of workmen who were out of work for some time after each raid, the damage must have been considerable. The Germans have 12 batteries round the town, but they were quite useless as there are no searchlights, and the gunners were simply firing at the sky."

Of the February aerial expeditions, those on Zeebrugge, on the morning of the sixteenth, and three raids on Bruges throughout the month, were the more important events. A squadron made an attack for over half an hour on the Zeebrugge Mole and the harbour and military works in the neighbourhood. A large number of heavy bombs were dropped, repeated reports subsequent to the explosions reaching the Belgo-Dutch frontier. Aeroplanes and seaplanes co-operated in another heavy bombardment on February 27. More than 50 heavy bombs were dropped on the harbour and neighbouring munition depots, the explosions resulting therefrom being heard in Holland, and the lights from the large fires which were caused were also seen from there. The garrison of Zeebrugge replied very feebly. The Allied aeroplanes disappeared in the direction of the sea.

According to the *Echo Belge*, of Bruges, in the course of the three raids by Allied airmen on that town, the railway line was destroyed and a vessel at St. Michel, occupied by Germans, was damaged. In the course of the second attack, which was made upon the harbour, serious damage was done to three torpedo-boats and the steamer *Colchester*. In the third raid a wharf for submarines between Lisseweghe and Zeebrugge

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was hit. In the third raid on Bruges, on February 16, 70 men were killed or injured, including many German soldiers and workmen engaged in the manufacture of rifle butts at St. Cruis, near Bruges. Heavy cannonading was audible at Flushing all day, together with loud explosions, supposed to be those of aeroplane bombs.

It was as a reprisal for "the attacks made by German submarines on British hospital ships in direct and flagrant contravention of Hague Convention No. 10," that a large squadron on April 17 bombarded the town of Freiburg. Many bombs were dropped with good results; and, in spite of a large number of air fights with hostile aeroplanes, all the British machines, except three, returned in safety. The next event of importance was the R.N.A.S. raid on the enemy destroyers in the North Sea.

The Sea Patrols

On April 24 it was announced: "The Vice-Admiral at Dover states that he has received a report from Dunkirk to the effect that on the afternoon of April 23 reconnaissance machines reported the presence of hostile destroyers, and three British naval machines were despatched to attack them. Five enemy destroyers were seen at 4.10 P.M., steaming between Blankenberghe and Zeebrugge in a north-easterly direction five miles off the coast. The leading machine attacked, dropped 16 bombs, one of which was seen to obtain a direct hit. The remaining four destroyers scattered, and were attacked by the two remaining machines, 32 bombs being dropped. The leading destroyer was observed to take a list to port and remain stationary after all bombs had been dropped. The four destroyers closed in on the disabled craft. A hostile seaplane attacked our machines, but was easily driven off. At 6.10 P.M. four destroyers were reported by reconnaissance machines entering Zeebrugge harbour." One of these destroyers afterwards sank.

Most of these raids were routine affairs, timed and scheduled to plan; rather the reverse were the encounters between the battling aircraft and enemy submarines. There was nothing rehearsed in these meetings, which were perhaps

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the most desperate and hard-fought encounters of the war in the air.

They were as a race apart these daring airmen, and they flew both land and sea planes, though the latter obviously were more suited to hunting submarines, or raiding harbours and shipping along the coast. Of the men some idea may be gained of the calibre from the mention in an official gazette which appeared about this time, as: "Under his command the squadron developed into a most efficient and formidable fighting force," or, "For conspicuous skill and gallantry during the past eighteen months," or, again, "He is a brilliant pilot." Nicely put to the point that. "His machine has been constantly under heavy anti-aircraft fire for long periods while carrying out his work." "He has taken part in numerous bomb-raids with successful results." "On one occasion he returned with forty holes in his machine." "For conspicuous skill as a seaplane pilot during the last nine months." And here is a characteristic enough remark: "On one occasion he descended to three hundred feet before releasing his bombs."

Of their machines and their adventures the adjective wonderful hardly meets the case. The seaplanes, which were armed with machine-guns, bombs and torpedoes—this latter fact a strictly kept secret at the time—from 1,000 feet could detect a submarine 100 feet below the surface provided the weather was not too boisterous.

Here is an adventure of a North Sea aviator. One sunny afternoon a wireless report was received at Dunkirk, from a reconnaissance scout, that hostile destroyers were out along the coast. Off went three British naval machines to attack them.

After some two hours' flight they sighted five enemy craft steaming below Zeebrugge, five miles off the coast. Down they sped to a lower altitude; down went three bombs almost simultaneously; and three more, and three more!—sixteen being dropped in all with one direct hit on the leading destroyer.

The remainder of the enemy craft scattered and broke in all directions. Again they were bombed furiously. The leading destroyer was observed to take a list to port, and

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remained stationary. The rest of the craft made off for harbour at top speed.

Then a hostile seaplane attacked our machines, but was easily driven off. And later, where originally five German destroyers had passed the long mole at the entrance to Zeebrugge harbour, but four again returned.

Adventures of a Sopwith Machine

Flight-Commander T. N. Gerrard, R.N., while flying a Sopwith triplane, on one occasion gave fight to a German machine, in the course of which most of the top plane of his machine was shot away. He returned safely, probably the first pilot to go up on one type of machine and return on another in one flight. This officer was awarded the D.S.C. for various services, among which the following may be mentioned. He led his flight, all on Sopwiths, against 15 to 20 hostile aeroplanes, and alone had no fewer than ten encounters with them. Into the cockpit of one he fired fifty rounds at point-blank range, and the enemy machine rolled over and over for thousands of feet, and then fell out of control. Flight-Commander Gerrard attacked another of the enemy, one which had just got on the "blind spot" of one of ours, and aided by one of the British squadron shot it down. Yet another of the enemy was attacked end-on so successfully that it fell away from the battle, although it apparently got into control lower down again. Flight-Commander Gerrard's machine was riddled with bullets, but he flew it back to the aerodrome.

New Traditions of Aviation

The Navy that Flew was quickly building up its own peculiar and imperishable traditions. Not least of these was the seaplane's invincible gaiety of spirit.

One naval pilot, on reconnaissance patrol, encountered two Halberstadts and an Albatros. He started off by pumping a tray of lead into the leading machine, and she went spinning down to earth. At this a veritable hornets' nest rose about his ears. Up came three more Albatros, the pilot of one of which, according to his official report, "showed his head precisely in the ring of the British pilot's sight." This eye for detail enabled him to recall the fact that he saw three bullets

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actually strike the pilot's head, with the not surprising result that the would-be avenger heeled over and spun to the ground. By this time the British pilot had been driven down to a height of 200 feet above German-occupied territory, and, having lost sight of the remainder of his aggressors, he decided to return home at that height. As was to be expected, his adventures were by no means terminated by this decision. An astonished company of German cavalry drew rein and peppered him with rifle shots as he whisked over the top of their lances. Five minutes later another Albatros attacked him.

He rocked the machine in giddy sweeps until within 50 yards of his opponent, and side-looped over him (this, remember, at 200 feet from the ground), fired a short burst, and drove the German off for a moment while he regained equilibrium. Then once more the enemy swooped upon him. From this point onwards the reader may be warned against vertigo. The pilot's own version, the bald official report of the affair, requires no embellishment or comment, though the latter is not easy to suppress. "These operations," he states, "were repeated several times with a slight variation in the way I looped over him flying against a head wind. When he was about 150 yards behind me I looped straight over him and, coming out of the loop, dived at him and fired a good long burst. I saw nearly all the bullets go into the pilot's back, just on the edge of the cockpit. He immediately dived straight into the ground. I then went over the German trenches filled with soldiers and was fired on by machine-guns, rifles and small field-guns (*sic!*) in or out of range. There were many shells bursting in and about the German trenches."

The report concluded with estimates of the strength of various bodies of infantry and cavalry, movements of convoys and artillery noticed during the intervals between aerial somersaults. The pilot landed at the first aerodrome he saw, adding in explanation of such an irregular proceeding that his machine was badly shot about.

Co-Operation with the R.F.C.

It is certainly surprising to consider that the co-operation between the naval and military aviators, invaluable as it proved

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to be, was but a phase—and a minor one at that—of the general activity of the Naval Air Service. It was to prove nevertheless of great benefit to both air services. Never had the naval men, gluttons for combat, had such a surfeit of air fighting; and they revelled in it. In the "Game-Book," which was the unofficial and irreverent title for the official log, were contained such entries as: ". . . squadron had 100 decisive fights in a month (omitting skirmishes), and accounted for 25 Boche machines"; or, "Four machines sent up; managed to bag 5 Huns before breakfast." This, it must be remembered, was fighting from dawn to dusk, generally a day's journey for a horse behind the German lines; at altitudes at which in spring a thermometer registered 50 degrees of frost; and often they returned with petrol pipes frozen, and hands and feet and ears swollen by frost-nip.

One—a Canadian—attacked a single-seater Albatros at 8,000 feet above the German lines. He disposed of him after a short engagement, and was then attacked by seven others, who drove him down to 3,000 feet and shot his machine to pieces. He plunged to the ground behind the Canadian lines, breaking a leg and dislocating a shoulder, but cheerful, and very thirsty.

CHAPTER VIII

A CHAPTER IN FRENCH AIR HISTORY

Personality in Flying—Guynemer, Leader of the "Storks"—A World's Record—French Spring Aviation Bombing Campaign—February and March Air Raids.

WHEN one considers the achievements of the French air service in the spring of 1917, that is to say, at the height of their power and fame, the question naturally arises: whether flying developed the individualist, or the individualist turned naturally to aviation; in particular one is concerned with the individual prowess of the young Guynemer.

In this war of multitudes, when one deals with a fighting front of over two hundred and fifty miles, and a million of troops are but a section of the battle line, attention can be more easily focused upon flying, as pre-eminently an individual undertaking.

Consider, for instance, the powers vested in the average air pilot. To a certain degree he was under orders from his base on the ground. But for every contingency that might arise in the air—and there were many such—he had to form his own judgment, and use his own initiative. There was no superior officer near at hand to advise him. The youthful airman had to rely almost wholly on his own judgment. His destructive powers were sufficient to do incalculable damage to the enemy. The accuracy of his observation might be the turning-point in a great battle. Even so, he had to be led. But his leading took rather the indirect form of inspiration—from some great leader, who shared with him, alike, the trials and dangers of his calling—than by direct command.

And where were those great leaders to be found? Practically speaking, one could say that, being physically capable, any

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man could fly an aeroplane. But the aerial genius was as rare—perhaps rarer—than his compeer in the Navy or the Army. In fact, a well-known British airman, and one who had been responsible for the training of well over two hundred aviators, told me once, "Of the many hundreds of men who take up flying"—it must be remembered that this conversation took place during the war—"roughly fifty per cent. drop out in the early stages—judged from the standard required of the battle airman. Of the remainder, thirty per cent. prove to be no more than mediocre pilots, and only ten per cent. ultimately may be classed as first-rate pilots; with a mere half per cent. of great leaders."

As flying developed, and aerial combat became more frequent, it was impossible to underestimate the value of these individualists. To what good purpose the enemy had turned the deeds of her great airmen may be judged from the extensive propaganda she carried out during the war with the names of Boelcke, Immelmann and von Richthofen. Britain meanwhile, however, had not been wasting time. The generals in charge of the training of airmen were young men with their eyes wide open. From the early days of training the men in the Air Service were schooled in the work of reconnaissance, bombing, photography or aerial combat, and whenever a pupil in their command showed aptitude for fighting, he was given every opportunity of development in that branch.

Again, where the German pinned his faith in highly developed machines and large squadrons, the French relied upon the human element, the man in the machine, and individual effort. The French believed that the war in the air would be won by the nation that was able to produce the greatest number of first-class air fighters. And in this, three vital factors had to be taken into consideration: Training, physical capacity, and the psychology of the individual. The methodical upbringing of the German tended to quench all initiative and create an undue seriousness in whatever he took up. One could take the air seriously, but not too seriously; it was not a haphazard plaything, but a stern reality! The young German was taught to live and fight and fly by text-book theory. That, again, was bad for a calling with all the vicissitudes which flying

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presented; and which, incidentally, necessitated rapid thought and more rapid action.

However, there was, and could be, no definite theory for the discovery and development of the great air leader. The necessity found the man. They sprang from all classes, were all manner of men and of every nationality. The German Boelcke was the first individualist of the air. Judging by his letters to his parents in Germany, he was an individual entirely without bowels of compassion. Ball was a schoolboy idealist who, when off duty, spent his time in growing roses outside his hut behind the battle lines.

Serving a long apprenticeship as a mechanic, Raoul Lufberry developed into the greatest air fighter of that great American Lafayette Squadron. Richthofen described his own brother—another German air leader—as “a butcher, not a sportsman.” Rhodes-Moorhouse, one of the earliest of the British flying V.C.’s, was a young sporting man, formerly a racing motorist, who took up flying for a hobby! About the same time Hawker—Major Lanöe—an officer in the Royal Engineers, was awarded the V.C. and the D.S.O. for two of the most gallant deeds of the war. McCudden—possibly the greatest of all the British air fighters—was formerly a ranker, who won his way up to a majority in the British Regular Army and every possible honour and decoration. Guynemer, a confirmed invalid and originally turned down by the doctors as being unfit for the Army, had to take a holiday after every hard spell of flying; yet rose to immortal fame.

Guynemer, Leader of the “Storks”

At the time that it had been officially announced that the Académie des Sports had awarded to Lieutenant Guynemer its annual Grand Prize of £400, established by M. Deutsch de la Meurthe some years before the war, his personality completely dominated the aerial battle situation on the Western Front. In the squadron—N.3, unofficially the “Storks” from the curious design their immortal leader had chosen to decorate his battle machine—he led, alone, can be quoted the following exploits of its various brilliant members, in the number of enemy machines brought down: Lieutenant Heurteaux, 19 machines; Adjutant

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Delorme, 17; Lieutenant Doullins, 10; Adjutant Chainat, 8; Lieutenant de la Tour, 7; and their leader himself, 30 German machines.

By February 2 Guynemer had claimed his thirtieth enemy plane; five of these having been destroyed by him between Tuesday and Friday of the previous week.

It was mainly due to M. Jules Védrines that Guynemer took his *brevet* on April 26, 1915, after a very short course of training, and already having been five times rejected by the Army as being too delicate for active service. When he died, September 11, 1917, he was credited officially with having destroyed fifty-three German machines.

Guynemer's first fight was on July 19, 1915. He was up in a two-seater machine with an observer to act as machine-gun operator. He came up with a German aeroplane just above Soissons, and over the centre of the city fought his first duel in the air.

It lasted ten minutes. Guynemer took his machine to within fifty feet of his rival to give his observer practically point-blank range, and the machine-gun fired 115 bullets. Then the observer was wounded in the hand, and Guynemer took control of the machine-gun as well as of the aeroplane, and continued the rain of fire.

All at once the German pilot sank forward in his seat, evidently killed or unconscious, and his observer threw up his hands in a gesture of despair. A fraction of a second later the German machine burst into flames and plunged to earth.

His astonishing career as a fighting pilot began when he destroyed four German aeroplanes on December 5, 8, 11 and 14, 1916. The first two fell within the enemy's lines, the third in the French lines. The fourth was secured after a terrible fight with a Fokker, and he only came off the victor after his own craft had been badly damaged.

He took a large number of photographs of enemy machines he brought down. These photographs were taken almost at the moment that his bullets struck them, or an instant later, as they began their downward crash to earth.

On February 22, 1917, Guynemer was decorated by President Poincaré, during his visit to Lorraine, with the Cross of

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St. George, which had been awarded to him by the Emperor of Russia; at the same time being promoted to the rank of captain. By the beginning of August he had destroyed fifty German aeroplanes, and claimed many unofficial victories in addition.

One of the most characteristic of Guynemer's feats was to force a German airman to land and surrender behind the French lines, although he himself had not a single cartridge left. He accomplished this feat by sheer mastery of flying and terrorising his enemy.

Captain Guynemer flew over and under the enemy machine heedless of the German airman's bullets, and forced him to drop to a lower level, completed the circle, and then passed over the German machine again. He repeated the performance until the amazed German gave up and landed.

The whole time he expected to be riddled with bullets as Guynemer passed above him. The German never suspected until he was told that the reason his adversary did not fire his machine-gun was that he had not a cartridge left.

With his twenty-first victory he established a new world's record for aerial combats, the air duel taking place at an altitude of over 13,000 feet. And at a distance of over forty miles behind the German lines, he sighted a German formation of two observation aeroplanes with an escort of two fighting machines.

The German machine nearest him chanced to be an observation 'plane, and he opened his machine-gun fire at an altitude of just two miles. He killed the observer with his third burst, and with the tenth the pilot was shot out from the machine, the plane at the same time beginning its whirling course down. The other three fled.

Once after having brought down three enemy machines Guynemer had a fall that nearly cost him his life. He was 9,750 feet up when a shell burst full in one of the wings of his aeroplane; the whole left wing was cut to bits, and in a few seconds there was nothing left on the frame but a piece of canvas the size of a handkerchief. His machine fell with a rush, and Guynemer gave himself up for lost.

"I pushed and pulled, but all to no purpose," he said. "I

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could do nothing. Down I fell, faster and faster. I shut my eyes, then I opened them again and looked down.

"At something like 110 miles an hour I crashed into a pylon. I looked round, and found that nothing was left of my machine. How is it I am still alive, I asked myself? I think it must have been the straps that held me in my seat which saved my life."

Guynemer was really brave, for he had a delicate constitution and vivid imagination, while possessing a full appreciation of the dangers he faced, but was nevertheless quite content. Just before he was killed he had remarked that if the war were over in six months he might hope to survive, but if it lasted longer he expected and was quite prepared to die fighting. He mentioned the case of a French pilot who was mortally wounded but managed by an almost superhuman effort to effect a landing behind the French lines before he died. Guynemer thought that was a magnificent thing, and said if it were at all possible he would do the same under similar circumstances, otherwise his friends might know if he were missing that he had been killed.

Unhappy anticipation, he was killed late in September, 1917, his machine plunging down to earth about 800 yards east of the cemetery of Poelcapelle, well within the enemy lines. There a German sergeant found his one-seater, with a wing broken and the pilot dead from a bullet wound in the head, and on him an identity disc with the name "Georges Guynemer."

The Avenging of Guynemer

A few days later his death was avenged by an even greater French airman, Fonck. Flying at a height of 7,000 feet on the afternoon of September 30 Lieutenant Fonck was attacked by the same pilot, Lieutenant Wissemann, flying the same German two-seater which had sent the leader of the "Storks" to his death. Having avoided the first rush of his antagonist, he got behind the German machine and opened fire from below. The pilot, subsequently found to be Wissemann, was shot through the head and fell out of the machine, while the observer was also killed.

As has been remarked, Captain Guynemer was at the hey-day of his career in the spring of 1917, and his influence is to be discovered in almost every daily official *communiqué*. In

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the first week in January the French lost two of their most prominent aviators, in Henri Bregi and Sauvage; but both deaths were avenged by Sous-Lieut. Delorme, one of Guynemer's squadron, on the 5th of the month. Sauvage had shot down 7 German machines when he died. He started for a flight over the German lines on January 3rd and was clearly seen by another aviator to be struck by a splinter from a shell. He saw his plane down, but was not able to ascertain whether he succeeded in restarting his machine after reaching the ground.

Between January 23 and 27 Guynemer claimed five enemy machines. His 26th, which was brought down on January 23, made one of some dozen enemy aircraft brought down by the daring French airmen that day alone. His victim fell in flames near Maurepas. Two other enemy machines were similarly brought down in the region of Verdun, one near Samogneaux and the other in the Spincourt Forest, and yet another in the neighbourhood of Veux Cere (Aisne). The following day Guynemer scored his 27th victory, and Lieutenant Heurteaux, a pilot of the "Storks" squadron, brought down his 17th, which fell to the ground and was dashed to pieces near Parvillers.

On the 25th January the leader of the squadron bagged a Hun, which came down in the French lines near Lignières. Lieutenant Heurteaux again also accounted for an enemy aeroplane—his 19th. A third and a fourth German aeroplane fell and were dashed to pieces as the result of encounters with French pilots. One dropped in the French lines north of Altkirch and the other to the south of St. Etienne-à-Arnes (Ardennes). This same day a French farmer single-handed captured two German aviators in a field in the Eure Department. The farmer, whose eldest son had been killed in the war, was in his field with a gun, and the two German officers, one of whom had the inevitable Iron Cross, put up their arms and surrendered. They said they were dying of hunger, and on being given a loaf of bread ate it heartily. They explained afterwards that as they had flown over Amiens, anti-aircraft guns had scored a hit on their engine; then they lost their way, and after wandering about for some time their engine

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had stopped, and they had to come down. They did not appear in the least sorry to be taken prisoners.

Once again, on January 26, Guynemer attacked an enemy machine and forced it to come down in the French lines near Doullens, both the pilot and observer being captured. This victory brought his total up to 30. This day proved one of innumerable air combats, and the French chasing squadrons had numerous decisive fights, in which 5 enemy aeroplanes were brought down.

So the story continues until it would take volumes to describe half the wonderful feats of the "Storks" and their great leader against the unlucky German airmen in this spring of 1917. As it is, to give some more concrete idea of the whole we will quote but a few instances—spells of fine weather of days at a time, when the French aviators achieved as much in a few hours as in months of the infantry battle below. Throughout March Guynemer's total of victories continued to climb steadily. On the 16th he got his 34th, and on the 17th his 35th enemy machine. Numerous engagements were fought by other French pilots on these two days; the French chaser planes were particularly active. In all nine German aeroplanes were destroyed, Lieutenant Doullins claiming his 12th, and Guynemer 3 in one day.

On March 17, Guynemer claimed his 36th victim, and Captain Doumer, a pilot of his squadron, his 6th. Two other enemy machines attacked by French pilots crashed to the ground—one north of Cerny-en-Lannois and the other east of Roye; two more were brought down by anti-aircraft guns. For the third day running the leader of the "Storks" got an enemy machine. Warrant Officer Madon, another aviator under his command, attacked at very close quarters and brought down his 8th German aeroplane. On the same day another enemy machine, after a fight with a French pilot, came crashing to the ground west of Altkirch. Again the enemy lost a dozen machines on March 20, Warrant Officer Douchy claiming his 5th.

April proved to be an equally brilliant month with the French battle machines, or, as they called them, *aeroplanes de chasse*. In the period from 10th-15th their aviators accomplished

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many feats. Captain Lecourt Grandmaison, Second Lieutenant Languedoc and Quartermaster Rousseau each brought down his 5th German machine. Lieutenant Pinsant also accounted for three enemy machines, bringing his total up to 8. Adjudant Vitalis brought down his 7th enemy, and Lieutenant Doullins his 13th. Guynemer also gained his 37th victory. Between April 16 and 22 Sous-Lieutenant Delorme brought down his 19th and his 20th enemy machine. Sous-Lieutenant Doullins his 14th, Lieutenant Pinsant his 9th and 10th, Sous-Lieutenant Tarascon his 10th, Sous-Lieutenant Languedoc his 6th and 7th, and finally Adjudant Lufberry, the famous American "ace" with the Lafayette Escadrille, brought down his 8th. While, as a climax to his great effort, in the period from May 17 to 30 32 German aeroplanes were completely destroyed on the French front in the course of aerial fights. In addition, 57 other enemy machines were seriously hit, and were smashed in falling into their own lines. Five of these victories were claimed by Captain Guynemer himself, four of them on the same day! Two of these machines were brought down within one minute, for the first time perhaps during the war.

These five new victories brought up to 43 the number of German aeroplanes destroyed by this gallant officer. In the same period Lieutenant Pinsant gained his 15th victory, while the totals of other well-known French battle pilots were as follows: Adjudant Madon, 12 machines; Lieutenant Tarascon, 11; Adjudant Jailler, 10; Captain Madon, 6; and Sergeant Souiller, 5.

French Spring Aviation Bombing Campaign

Consecutively with this intensive period of aerial combat, the French maintained their war-long aerial raiding on the German military lines and lines of communication. Twenty machines on the night of January 4 bombed the German aerodromes of Matigny, Haucourt, Flers and Bernes, and the railway stations of Rouilly, Athies and Villecourt, and the cantonments of Roye received numerous bombs. The next two nights—invariably night expeditions, it will be observed—French bombarding squadrons dropped bombs on the aero-

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drome of Ghisteltes and the railway station and hutments of Guiscard, where four fires and several explosions were noticed. The following night—the 6th—German bivouacs south of Spinecourt were bombed, as also the ammunition dumps at the farm of Longeau and the railway station of Mesnil—St. Nicaize. On the 6th, again, during the night a French squadron bombarded the German aerodromes at Haucourt and Matigny, the station at Arcigny, the enemy cantonments at the Liaucourt Wood, and the depots at Attichy.

Then for three weeks there was a distinct lapse in this form of activity, the majority of the French bombing planes being requisitioned for tactical raids on the actual battle-front. On the 24th, however, during the day, and during the night of the 25th there was more than considerable activity in long-distance raids. French bombarding squadrons carried out the following operations: over 2,000 kilogrammes of projectiles were dropped on the railway station of Brioules, where a great fire was caused. The railway stations at St. Quentin and Voynnes, and the huts at Guiscard, the railway station of Tergnier, and the military establishments to the south of Chauny were also plentifully bombarded; as also were the railway station and military workshops at Ham. In the latter case a fire and a big explosion being observed. And on the night of the last day of the month French aeroplanes bombed bivouacs in the environs of Etain, the military factories of Ham, the stations and factories of Polembray, and the stations of Athies, Hombleux and elsewhere.

Throughout February and March the principal French raids were as follows:

<i>Date</i>	<i>Objective</i>	<i>Result</i>
Feb. 2 (N.)	Colmar, Rombach, Chauny, Ham.	Attack on barracks and railways.
„ 10 (N.)	Karlsruhe.	Station and barracks attacked.
„ 14 (N.)	Rombach and Hagondange.	Attack on blast furnaces.
„ 15 (N.)	St. Quentin and Ham.	Railways bombed.
„ 24 (N.)	Squadron bombed Grand-pré and Romagne-sous-Montfaucon.	

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<i>Date</i>	<i>Objective</i>	<i>Result</i>
Feb. 25	Spinecourt.	Bombs dropped on munition depot.
Mar. 3	Frescati and Woelfling.	Bombs on blast furnaces.
„ 5 (N.)	Squadron dropped over three tons of bombs on Varennes aerodrome.	
„ 16 (N.)	Squadrons raided Arnaville and Volkingen factories.	
„ 18 (N.)	Squadrons bombed Thionville foundries and factories.	
„ 22 (N.)	Two tons of bombs dropped on Thionville factories.	
„ 25 (N.)	Thionville and Briey Basin.	Ton of bombs dropped.

CHAPTER IX

AIR WAR IN THE TRENTINO

General Battle Situation—The Advance from the Air—Spring Air Activity—Days before the Advance—The Carso Battle—The Night after the Battle—The Second Day—Flying over the Carso Battle—Actions and Re-actions—Results in Brief.

ITALY'S tremendous aviation effort in 1917 generally has never been appreciated by the world at large. Distance lent criticism to the situation. Even her own Allies were inclined to quibble and criticise. Demands for renewed and again renewed activity were inevitably her lot; but rarely did she receive any thanks. Not a little wonder was expressed that with her unusually fine air fleet she did not succeed in the autumn of 1916 in blinding once and for all the eyes of the invading Austrian divisions, and render impossible that inglorious advance of theirs in the Trentino. Said her critics: "She has the aircraft; she came into the war better equipped in this respect than any other belligerent except Germany; why doesn't she use them?"

The claim is admitted. The Italian airships—of the semi-rigid type—were second to none in the world. Her heavier-than-air craft, and particularly the giant Caproni machine, which developed into one of the finest long-distance raiding craft in the war, were unsurpassable. Nevertheless, the criticism was most unjust. The air situation, though technically apart from the main battle situation, is influenced thereby throughout. Where your battle line is, there, behind it, are your air bases, and over that area your aircraft for the most part will be operating. And the better to consider the one in relation to the other, it will be wise to take a brief résumé of the Italian-Austrian battle fronts at this time.

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Throughout the year Italy had to divide her air forces between three main fronts, each separate and distinct, and not the least important of them was the aerial defence of the Adriatic. On the ground General Cadorna was confronted with a more indomitable enemy than either Austrian brilliance and strategy or German cunning in machinery could devise—a mountainous and almost impassable battle area.

Throughout the year Italy was compelled to fight hard and continuously on two fronts—according to Colonel John Buchan in his admirable "History of the War"—to press against the Isonzo barrier, and at the same time to win safety in Carnia, the Dolomites, and the Trentino. Napoleon in 1798 and Masséna in 1805 did not dare to cross the Isonzo till Joubert in one case and Ney in the other had forestalled the danger of an enemy flank attack from the hills. Italy's battle front was, therefore, not less than five hundred miles from the Stelvio in the north to the sea at Montfalcone. Moreover, they were five hundred of the most difficult miles in Europe. Beyond the Isonzo lay that strange plateau of the Carso, which had long been selected for the Austrian defence. There trenches and shelters had been hewn out of the solid rock, since ordinary field entrenchments were impossible in a land where there was no soil. The enemy had to be ousted from his hold before any advance could be made, and the campaign became in the strictest sense an attack on a fortress. North of the Carso was the town of Gorizia, a formidable entrenched camp defended by 200,000 troops, and, with its flanking positions, showing a width of over sixty miles. North and west of the Isonzo was the long horseshoe of the mountain front. Every pass was, to begin with, in Austria's hands, and to win security the enemy had to be pressed back over the watershed. Moreover, on Italy's left flank the ominous salient of the Trentino ran down into the Lombard plain, and offered a choice of a hundred starting-points for an Austrian assault upon the Italian rear. In strategical anxieties and tactical difficulties the Italian battleground was one of the worst in the whole *terrain* of the campaign.

"These military drawbacks found a counterpart in the condition of Italian politics. The great majority of the nation was

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wholeheartedly for the Allied cause; but so far war had only been declared against Austria-Hungary, and Germany was nominally not yet an enemy. The immense purchase which Germany had won by her control of Italian commerce and finance made a breach with her unacceptable to many classes. This partial avoidance of the main issue led to some fumbling in Italian policy, and to the intrigues which always attend indecision. Moreover, it prevented the army from being what it was elsewhere, the whole nation in arms. During the long and desperate winter struggle, the troops which, under Cadorna, held their own so gallantly among Alpine snows and the floods of the Isonzo, did not yet represent the true sum of Italy's fighting strength."

This then was Italy's position in the preliminary stages of her entry into the Great War. Meanwhile the Duke of Aosta's great advance in August 1916 had won Gorizia, and in addition, the great range from Poggiora to Sabotino, which dominated the Isonzo. This front was always in the condition of being turned on its left flank and rear, and only an assiduous watch in Carnia, Cadore, and on the Trentino battlefields prevented a peril which, had it become active, would have led to complete disaster. Thus, realising the Italian difficulties, we shall do justice to the magnitude of her achievement.

The Advance from the Air

In this country of towering mountains, deep gorges and impassable ravines it is simpler, and, for that matter, more accurate, to estimate the nature of the general fighting through the eyes of hundreds of gallant Italian reconnaissance, fighting and bombing pilots.

During the first three months of 1917 there was a constant bickering along the fronts in the Trentino, the Dolomites, and on the Isonzo, but no movement other than an occasional trench raid. Italy was busy behind the lines preparing for a great effort. As may be conjectured from the hurried visit to General Cadorna in late March of General Sir William Robertson, who was accompanied by General Weygand, Foch's Chief of Staff, an enemy push was equally anticipated.

The imminence of both these advances is plainly discernible

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in the varied activities of the Italian aircraft during January, February, March and April, 1917.

Spring Aircraft Activity

During the night of January 5-6 an Italian aeroplane flew over Trieste and returned along the coast; 440 lbs. of explosives were dropped upon the station at Nabresina, and in the region of Mont Querceto (Hermada). A squadron, on the 8th, successfully bombarded military objectives S. Daniele and Cobdil, and Reifenberga, in the valley of the Branizza. While on the 11th and 13th respectively, two machines bombed the Austrian aviation ground at Prosecco and the seaplane base in the harbour of Trieste. Italian and French seaplanes effected an offensive reconnaissance over Pola, dropping bombs on enemy units.

On February 12th Italian seaplanes attacked Pola, where were concentrated large enemy naval forces intended to co-operate off the Adriatic coast with the big advance ashore, dropping a quantity of explosive and incendiary bombs with visibly good results on the arsenal and vessels in the harbour. At the same time one of the pilots of this squadron succeeded in bringing down and capturing the Austrian aviator Babic, a naval lieutenant in whom the enemy lost one of its best pilots. This officer had participated in a great many Austrian raids on Italian territory, among others the raid on Padua. He had also flown over Venice on several occasions. True to Austrian mentality, Babic displayed no remorse at having murdered many innocent victims. For all that, he was very much surprised at meeting with fair treatment at the hands of the Italians, from whom he feared reprisals for having bombed Venice with its priceless treasures.

Italian airships later in the month became active. On the night of the 20th one of them successfully bombed Austrian billeting areas, which had only recently been run up preparatory to the advance, situated north-east of Komena (Carso), causing an outbreak of big fires. Again on the night of the 25th two Italian airships successfully bombed the railway station of Reifenberga, in the Branizza Valley, and the aviation ground of Prosecco, north of Trieste. On this objective 2½

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tons of high explosive were dropped with effective result. In spite of heavy fire from hostile anti-aircraft batteries and of a violent unfavourable wind, the airships returned safely to their bases. Reifenberga was the most important railway junction on the enemy lines of communication in this area.

February lapsed with diminished aerial activity, but March developed into an unusually busy month. With regard to the former the only noteworthy events were an Italian raid on the 27th on the enemy's billeting areas in the neighbourhood of Serrada, on the Folgaria Plateau; a successful bombardment of the enemy's lines of communication on March 1; and the latter month's activity commenced with an evening raid—March 10th—on the valley of Muggia (south of Trieste) and on the dockyards at San Rocco (west of Muggia) and Santa Babba, on the Bay of Muggia.

In the meantime events were rapidly shaping for the battle. The aircraft activity was renewed; doubled and trebled. Cadorna had intended to attack in April, but the lateness of the spring forced him to hold his hand. His plan was to engage the enemy on the whole Isonzo line, from Tolmino to the sea, by an intense artillery action, so as to puzzle him as to where exactly the infantry were to be launched. In preparation of these events, on the night of March 19th developed the fiercest air fighting thus far of the Italian-Austrian war. The fine weather prevailing brought out every available aircraft on both sides. The Italians drew first blood; after a brisk fight bringing down two Austrian aeroplanes, one of which fell within their own lines. Their airships, in spite of a strong head wind, succeeded in dropping a ton of high explosives on the railway station of Galliano (Lagarina Valley), and on the railway to the north in the direction of Matterello, with good results. The airship escaped from the heavy anti-aircraft fire and returned safely. At the same time a squadron of Austrian seaplanes dropped bombs on the lagoon of Grado, but fortunately causing no casualties and only slight damage to buildings.

The Italian seaplanes carried out reconnoitring and offensive operations against the Austrian naval port of Pola, dropping bombs on the arsenal there. Five Austrian aeroplanes, escorted

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by destroyers, ascended to counter-attack, and after an aerial engagement were repulsed by French aeroplanes which were supporting the Italians.

Finally, in the morning, a little before daybreak, a squadron of Austrian seaplanes dropped bombs on Grado and the coastal zone to the east of Grado. The damage done, fortunately, was insignificant, and there were no Italian casualties. Immediately afterwards a squadron of their seaplanes bombarded the Lloyd shipyards at Muggia, near Trieste. All the Italian and Allied machines returned safely to their bases.

On the seventh of the following month—April—occurred one of the most tactically important Italian air raids of the period. At Reifenberga, and Mecari, in the Branizza Valley, the enemy had concentrated all his reserves for the coming push; and thence on the night of the seventh proceeded the full force of one of the most powerful of the Italian bombing squadrons. About a ton of bombs was dropped on the huts and depots and, despite the heavy fire from Austrian anti-aircraft batteries, all the machines returned in safety. In the morning following a squadron of enemy seaplanes carried out a raid on the Monfalcone area, one of them being hit by the Italian artillery and falling in the vicinity of Casaghamo.

The Days before the Advance

By April 13 both armies had more than a suspicion of the other's intentions, and sent out every available aircraft to win and hold the battle skies. Two only of the enemy aviators succeeded in crossing the zealously guarded area of the coming Italian advance, and both paid for their temerity with their lives. Despite heavy artillery and machine-gun fire, one of the Italian squadrons swept low, dropping bombs on the railway stations of Prebacina and Vucia Draga, in the Frigido.

The second day after—the 15th—General Cadorna arrived at Venice for an important council of war. The next day the enemy got news of the visit. During cloudy weather, supported by submarines and torpedo-boats, an Austrian air squadron flew over Venice, intending to bomb the Italian Commander-in-Chief's headquarters. An immediate counter-attack

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by combined Italian and French machines, aided by anti-aircraft batteries, prevented the hostile machines from reaching the city. During the aerial fighting which ensued and was continued far out to sea an enemy aeroplane was brought down; while two Italian seaplanes failed to return to their base.

Smashing the Enemy's Lines of Communication

Now the Italian High Command commenced to use every available aircraft to raid and bomb important points of the enemy's lines of communication. Here is one such record for five days, April 17 to 21. April 17: An Italian aerial squadron bombarded Chiapovano, an important enemy revictualling centre to the east of the Bainsizza plateau, in spite of violent fire from the enemy's artillery; April 18th: Aerial squadron bombarded enemy hutments in the neighbourhood of Chiapovano, Dorinberga Reifenberga, and Komena; April 19: Airship bombed with good results the railway station and lines of Obcina, returning safely afterwards; April 21st: An Italian air squadron bombed the railway centre between Prebacina and Dorinberga (Vippacco Valley). All these objectives, without exception, were situated in the direct line of the forthcoming Italian advance.

At last the time for the latter grew nearer, and with it the activity of the aircraft redoubled. On May 3, while the Italian aviators were dropping bombs on a railway centre near Sesana, Austrian aircraft raided Fogliano and Sagrado; and during the night four hostile aeroplanes bombed Gorizia. On the night of the 9th enemy airmen were unusually busy, dropping bombs on several positions on the Lower Isonzo and in the neighbourhood of Cormons; particularly on an Italian hospital near Romans.

In a vain attempt to upset the plans of the Italian advance at the eleventh hour, hostile aircraft dropped bombs in the Gorizia area; however, without doing any damage. At the same time Italian seaplanes bombed the aviation base at Prosecco, north of Trieste. On the previous day one of their squadrons bombed the railway works of Reifenberga, which already has been mentioned as a position of great importance

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in the enemy lines of communication, with good results, and returned safely.

The Carso Battle

Enemy aircraft on the night of the 11th bombed Punta Sdobba, an important Italian supply depot, and some other places on the Lower Isonzo; fortunately, without causing any damage; and an Italian squadron bombed the railway works at S. Daniele, in the Branzza Valley (Frigido). A Caproni machine reached Pola, and caused a fire to break out in the arsenal. An enemy machine succeeded in reaching Brescia, but did not drop any bombs.

On May 12 the preliminary Italian artillery bombardment commenced and continued until the 14th; every day growing more intense. On the latter date the main infantry attack was launched between Globna, a mile north of Plava, and the defile of Salcano, almost in the suburbs of Gorizia. Austrian aircraft on the eve of the battle dropped bombs on Isola Morosini and other localities on the Lower Isonzo. Italian seaplanes renewed the bombardment of the Austrian aviation base of Prosecco, north of Trieste, from which all the enemy reconnaissance flights were commenced. On the Trentino enemy aeroplanes made repeated attempts to reconnoitre in the Sugana Valley, but were driven off by the Italian air patrols. Aerial activity increased on all hands. Again a hostile squadron dropped bombs in the Aquilega area. In a brilliant engagement on the Middle Isonzo two enemy machines were brought down by the Italian airmen. The infantry attack was launched on the morning of the 14th.

In every phase of that brilliant advance, and in every fiercely contested mile, the Italian aircraft were to perform amazing feats. With the first grey streaks of the young dawn lining the eastern sky, they were high in the heavens above the still silent battle lines scouring the Austrian positions before the line Plava-Salciano, where General Cappello's Second Army was directed against the heights east of the river. In front of the gallant advance of the 127th and 128th Regiments of the Florentine Brigade, forcing their way through a devastating fire towards Hill 535, on the spur of Monte Kuk,

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went the aircraft; the airmen flying at about 1,600 feet from the ground, opening fire with their machine-guns on enemy troops which were there assembled, and dispersed them. Came a report that the enemy were hurrying up reinforcements in the neighbourhood of Chiapovano; a call for aircraft to harry and delay them. Throughout that morning the aviators were hard at it, heavily bombarding and causing innumerable casualties to two Austrian divisions on the march. And the 231st and 232nd Regiments of the Avellino Brigade crossed by the bridge at Zagora, and took the fortress of Zagomila.

On their right the 230th Regiment of the Campobasso Brigade struggled up the slopes of Monte Santo; their attack being held up by the Austrian second line, which was 800 feet above the river. Again came the call for aircraft co-operation. Immediately a strong squadron of Italian aeroplanes dashed out into the skies over the battle lines, and dropped over 200 bombs on the enemy's trenches and supply columns hurrying up to the firing lines and on the lines of communication east of Gorizia.

The Night after the Battle

For the infantry night-fall came as a welcome respite after their arduous task of the day previous; only the Italian artillery were busy, incessantly bombarding the dark masses of the Austrian lines before their positions; over their heads the night bombing airmen were busier still, carrying death and destruction far and near in the Austrian lines. A sham raiding party set out for Bodrez, between Plava and Tolmino. Taking advantage of the panic and confusion thus caused, two battalions of Bersaglieri and Alpini surprised the Austrians and forced a passage of the river near Bodrez; establishing a bridge-head there, and holding it until the next day's dawn, when the attack was resumed all along the line.

Early again the airmen were at work. In the morning and throughout the day aeroplanes effectively bombarding the enemy's rear lines; the same objectives receiving considerable attention from the airships during the following night. On the left front down to the sea artillery machines were busy directing

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the fire of a lively artillery bombardment; all this being accomplished despite the attacks of innumerable enemy machines and anti-aircraft batteries, which had been rushed up to the firing lines from other positions all down his lines. The Italians suffered no single loss in aircraft on that day.

The Second Day

As a result of the splendid spade work of the aircraft, the Florentine Brigade, a little after midday, reached the northern summit of Monte Kuk; and the Avellino, working up from Zagoram, took the southern crest, and drove the enemy out of Hill 524, one of the spurs of Monte Vodice. While at sea, not without its direct influence on the Carso battle, a desperate sea air battle was taking place in the Adriatic; the same day—May 15.

Italian airmen, after a lively encounter with Austrian aviators in mid-air, attacked the enemy warships outside Cattaro, setting a cruiser on fire. The latter was taken in tow off Cattaro in a sinking condition, and another Austrian cruiser was badly damaged by the airmen's bombs.

According to a semi-official statement issued in Rome the following day: "Our daring seaplanes, after repulsing the hostile machines in an aerial combat, attacked the enemy ships with bombs, and were subsequently able to confirm the serious damage suffered by them as the result of the fire to which they had been subjected. Two different aeroplanes reported that one of the enemy cruisers, which was completely shrouded in smoke, with its afterpart destroyed, was on the point of sinking close to Cattaro. All the units engaged in the actions returned to their bases, as also did all our aviators."

The grave pressure of the Austrian counter-attacks of May 16th, in the region of Kuk and Vodice, and against the central Carso position, was only relieved by a timely airship raid on the Frigido Valley. Favoured by the clouds the daring Italian airmen descended to a low altitude and dropped bombs and fired with machine guns upon the enemy's cantonments. The airship afterwards returned safely to her base. And again on the night of the 17th another airship, under cover of clouds, was able to reach the Austrian near lines east of Gorizia without

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being observed, and bombed enemy encampments, returning safely.

When, on the 18th, the gallant handful of Bersaglieri and Alpini, far to the north at Bodrez, having fulfilled their task of worrying the enemy's flanks, were withdrawn, aircraft were flung in hurriedly to fill the gap thus occasioned, and activity in the air waxed intense. Italian squadrons dropped bombs on encampments east of Canale, and in the Gargaro Valley, returning safely to their bases; and, *en route*, bringing down two enemy craft.

Italian seaplanes at the same time dropped bombs on the enemy military organisations on the Isle of Lagosta.

Flying over the Carso Battle

Something of the local conditions prevailing in the air over the Carso battle during these latter operations can be gained from the following personal account, given by the correspondent of the *Secolo* about this time. He says: "Guns are roaring all around me. Flight squadrons dash through the sky, heedless of fire and shells. Our scouts are tireless. Our anti-aircraft guns fire without intermission. Two Austrian Albatros machines steer for Punta Sdobba, and are headed off immediately by two swift Italian 'planes. Instantly afterwards there is a fight over Gorizia between one of our Farman machines and an Austrian. Lieutenant Ruffo comes to the rescue, swings up 1,000 feet higher, and drops between both, discharging his machine gun on the enemy, who is crippled and disappears. When Ruffo lands he is handed a dispatch from his comrade, thanking him for his intervention. Another Farman machine is attacked and Lieutenant Ruffo is again on the scene. The fight is over the Carso, and down comes the Austrian. It is the 7th machine hit by Lieutenant Ruffo. He hardly has time to breathe, when at dusk he sees three Austrians attacking a lone Farman, and once more dashes to the rescue. He discharges his machine gun on the first Austrian machine, which turns a somersault and falls over San Marco. It is Ruffo's 8th victory. From my observation post I witness two other air fights at the same time. Two Austrian machines are driven to shelter behind Monte Kuk, and a third, after a short en-

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counter, vanishes on the horizon. As I write the guns are still blazing away and battles are fought in the air."

Actions and Reactions

For eight days—May 16-23—violent gales of wind prevented aviation on any extensive scale. This period, for the Italian infantry, was made up of repulsing innumerable Austrian counter-attacks delivered against the central Carso position. Then, on May 23, as the second stage of the great battle—which had been preceded by a heavy artillery bombardment the previous evening—particularly in the Santo and San Gabrielle sections, opened on the front between the southern edge of the Carso and the Adriatic, Italian air squadrons, to the strength of 130 machines, and including a group of navy seaplanes, took part in the battle. The aviators dropped ten tons of bombs on the enemy's lines, and brought their machine-guns to bear on the masses of his infantry. The result of these operations was that, by the evening of that day, the Austrian first and second positions had gone, from Kostanjevica to the sea.

The aircraft was very active the following day. Squadrons of Italian machines bombed the station of Santa Lucia of Tolmino with visibly effective results; while three enemy machines were brought down.

At daybreak, with the object of assisting the offensive, British monitors with naval forces and Italian aeroplanes made a prolonged and effective attack with heavy guns in the gulf of Trieste on the rear of the Austrian lines, especially the great aerial station, depots, and other important military objects near Prosecco.

The repeated attacks of the Austrian aircraft had no other result than the loss of two seaplanes, which were brought down by Italian airmen. Four enemy airmen were rescued by Italian naval units, in spite of the fire from the Austrian batteries, which, with their customary chivalry, opened fire on friend and foe alike, indiscriminately. All the naval and aerial units which took part in the Allied action returned to their bases "without having sustained the slightest damage. No enemy flag was seen at sea with the exception of those on the aeroplanes which we brought down."

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On May 25, as the left wing of the Italian Third Army fought its way through a fierce barrage from the north towards Kostanjevica, Italian airmen flew in great numbers over the Austrian rear lines, bombing railway works, ammunition dumps and batteries, and attacked the enemy infantry on the march.

It was largely due to this timely aerial operation that, on the following day the Timavo was crossed, and the village of San Giovanni was taken. This victory, in its turn, was again conserved by the Italian aircraft, which continued their successful bombing raids on the Austrian communications. The railway station of S. Lucia, of Tolmino, was severely damaged; while during air fighting above Brestovica an enemy machine was brought down, and another fell in flames near Vertoiba.

Results in Brief

The battle concluded in early June, while the fine weather was still favourable to aerial activity. Enemy aircraft which attempted reconnaissances over the Italian lines, however, were driven off immediately by their alert aviators, who, in turn, carried out several heavy raids far into the enemy's country.

Moved by a motive of sheer revenge for the heavy military defeat inflicted on them, on the night of June 2 Austrian aeroplanes coming in from the sea flew along the coast towards Venice and dropped bombs in the environs of the city. Italian and French seaplanes immediately went up, drove them off, and, continuing on their way notwithstanding the enemy fire, successfully bombed industrial establishments near Trieste, and military points near Parenzo. The Austrian airmen caused little damage in Venice, apart from killing a few helpless and harmless civilians.

While the Italian nation was incensed at this childish display on the enemy's part, the Italian Army, while regretting the losses inflicted on the civil population, was elated by the enormous gains accruing from their recent military victory.

Only the previous day—June 1—preceded by the aircraft, machine-gunning the dense masses of the enemy infantry from a low altitude, the Italian infantry had carried on their attacks on Hill 174 at Tivoli, and the southern crest of Vodice. Both

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these advanced parties consolidated their gains, until, on the morning of the 4th, warning was given by a reconnoitring airman that the enemy were concentrating two picked *sturmm-truppen* battalions of Hungarian and Tyrolese for a counter-attack before the ridge of San Marco. Almost immediately afterwards the attack was delivered. The Italians gave some ground. But that evening, again preceded by low-flying aviators, the 215th and 216th Regiments of the Tiber Brigade and the 251st Regiment of the Massa Carrara Brigade retook the ground and annihilated the storming parties. The battle to all intents and purposes was ended; Cadorna's great victory complete.

In this great advance on the Carso, the most important and extensive which had been made yet on this mountainous front, and in which aircraft, if not proving a decisive factor, at least had made victory possible only by their incessant reconnaissance flights and bombing raids, the Austrians lost 24,000 prisoners and not less than 100,000 in dead and wounded. Cadorna's attack had failed nowhere. Starting from a position in a high degree precarious and difficult, in due course it had won security for its flanks, and brought the Italian armies to the very gates of Trieste—the edge of Hermada in the south, and, in the north, to the Branizza plateau, which was the key of San Gabrielle and San Daniele.

CHAPTER X

FROM PETROGRAD TO KUT EL AMARA

Bulgarian and Russian Aerial Activities—The Russian Debacle—The East African Air Campaign—Summer and Autumn Developments—A Gallant Rescue at Salonika—Macedonian Developments—Bulgarian Aerial Tactics—Aviation in the Middle East.

FROM Petrograd to Kut el Amara, while these big developments were shaping, on many an outlying front the aircraft were beginning to dominate the general battle situation. Where at Salonika the air war during the previous autumn had been so active, for some reason or other in the early spring of 1917 it died away to occasional spasmodic bouts of aerial combat and bombing raids; and apart from a certain very gallant British rescue no incident of this period is worthy of repetition in these chapters.

In Mesopotamia, meanwhile, the aviators were rendering excellent service harrying the fleeing Turks in their wild retreat from Kut el Amara. The enemy undoubtedly suffered more casualties by this cause, or at least as many, as in the infantry battle for that much-contested stronghold. In Sinai, on the other hand, the British airmen were no longer having it all their own way in the matter of aerial combats. The wise folk at Johannisthal, Germany's great aviation centre, suddenly had awakened to the fact of the extreme value of aircraft in warfare of a guerilla nature, such as their Turkish allies were now indulging in in Sinai and Palestine, alike. Soon brand-new German aeroplanes began to appear against the British front, not a few of them manned by German crews. The new phase added very considerably to the difficulties and dangers of our pilots. Unlike the Turks they had to make shift with old-type machines. Every new British aeroplane was now

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wanted for the Western Front, and these outlying squadrons, for the time being at least, had to make shift with the best aircraft they could lay their hands on. Certain machines which they were allotted, it must be admitted, should have gone on the scrap-heap, rather than be entrusted with valuable lives in the grim business of war. Nevertheless, despite these extreme hardships, the British pilots on the Sinai and Palestine fronts continued to put up a good fight.

Bulgarian and Russian Aerial Activities

Not alone in Sinai was this new Germanic aerial influence traceable. The Bulgarians—apt pupils of such brutal masters—soon began to adopt highly approved German aerial methods against the unhappy Serbs. While employing their aircraft to drop in our Ally's lines lying propaganda of growing discontent between England and France, they seized the opportunity at the same time of bombing sundry Red Cross hospitals in the neighbourhood of Vetchkop.

This unholy practice of bombing hospitals was carried to even greater lengths by German airmen raiding the Russian lines. Here, by the 16th of March, the unwieldy Russian first republic had begun to totter on its brief, unsatisfactory life; ending in a wholesale dissolution of the structure of its constitution. For a time, a very brief time, the war against Germany continued. Then the influences of the various revolutionary parties began to make themselves felt. Unfortunately, as ever has been the case in the history of revolutions, the first doctrine of the revolutionary rapidly developed into a doctrinaire of peace and universal brotherhood.

Gradually, one after another, various regiments at the front laid down their arms and gave up the fight. Soon the whole Russian army on the Eastern Front was in a state of hopeless chaos—an idle mockery of that splendid defence which these gallant troops till then had maintained against the persistent enemy attacks on their lines. Strangely enough, however, while the infantry, cavalry and artillery soon disbanded themselves, the air forces fought on until the very last moment; and then only gave up through lack of supplies, ammunition and petrol.

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Perhaps no more pathetic phase of the whole of the Great War is to be recorded than the last days of the Russian air service. Loyal to the core, just beginning to be equipped with new and up-to-date machines, gallant and daring in all ranks, the aviators of our eastern Allies were doing wonderful things in the air when the crash came. Even then they persevered long after the armies had been disbanded, and were still carrying on their work to the bitter end; until the end of June. By 16th March, when the *coup d'état* in Russia was over, the Russian aviators were valiantly struggling against the great superiority of the German airmen, both in fighting over the lines and long-distance bombing raids on the lines of communication and points of military importance far behind the lines.

Paraphrased Adventures

Despite the fact that in the opening weeks of the year the enemy were coming over in large and powerful squadrons and bombing the Russian infantry trenches from one end of the line to the other, Russian airmen were equally active. In a period of nine days—January 1-8—bombs were dropped on Kovel, in the village of Goloba, 30 versts (20 miles) south-east of Kovel station, Zablote, west of Brody, and the village of Jasenoff, south-west of Brody. Three German aeroplanes were brought down on the 2nd of that month; one by artillery fire near the village of Iva (south-east of the Vishnevsk Lake); the aviators, an officer and a private, both being taken prisoners; also two more in the region of Porskaia Vulka (south-east of Kovel); both the machines in this case being smashed, and the four enemy aviators being killed by the fall. Altogether, during January, Russian airmen brought down 8 enemy machines and bombed the following positions in his lines: Zablote, Kovel, Goloba, Brody and Jasenoff. The month's victorious record, however, was marred by a tragedy which overtook one of the Russian reconnaissance pilots. On January 27 one of their Farman machines, in charge of aviator Ensign Plugin and observer Staff Officer Kiseleff, returning from a reconnaissance flight, was attacked by a German battle-plane, with which they engaged in combat. After a brisk exchange of machine gun rounds the Russian aeroplane caught

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fire and fell in the region of the river Shara, south-east of Baranovichi, in front of the barbed wire entanglements before the Russian lines. The dead bodies of the pilot and the observer were brought in the same day.

Of these adventures, and there were many such which daily occurred amidst the snow and the ice, and the bitter cold of that most romantic front of any of the Great War, the Russian High Command rarely found time for detail in their terse official reports. But reading between the lines one can see the far-reaching effects of those thrilling events of the air war, many of which thus were dismissed in an apologetic half-dozen words, or a single phrase. Thus: "Two of our aviators dropped bombs on the enemy's aerodrome in the town of Kobilnik:" but never a word regarding the result. On the afternoon of February 12th, again, four further bombs were dropped on Kobilnik. The plans of the enemy aviators here, for instance, were held up for over a fortnight at a critical phase of the infantry battle below.

An inspiring mid-air battle, which lasted for over two hours and at a height of 10,000 feet, was fought by a Russian aviator in the region of Shelvoff. The enemy machine finally fell into the enemy lines. As yet there was no visible sign of that sinister unrest so rapidly coming to a head in the lines of the army in the field, so the Russian airmen continued to fight on. The Revolution broke, still they fought on; the armies disbanded in hopeless disorder, still they fought on. In early April, when the Russian army was no longer anything but a name, they bombed and attacked the exultant and victorious enemy as they rapidly pushed farther and farther into Russia. Down on the Black Sea Front the seaplane squadrons still maintained their almost daily aerial attacks on the Bosphorus; from Rumania their bombs played havoc with the German batteries of heavy artillery. As late as June 2, Lieutenant Orloff, one of their crack pilots, carried out a single-handed night raid on the German positions near Stanislaw, dropping a number of bombs.

Perhaps the incident most characteristic of these gallant aviators who refused to recognise defeat occurred on March 27, on the Black Sea Front, where two Russian airmen un-

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aided captured a Turkish war vessel, and brought it into harbour a prize of war.

The East African Air Campaign

About this time, and many months behindhand, the first accurate account of the work carried out by our aviators in the hard-fought campaign against the surviving German forces in East Africa began to find their way home to England. "The work of the Air Services has been most creditable," General Smuts had reported in his despatch of the previous 27th of October. "In addition to their reconnaissance work there is evidence to the effect that both material and moral damage has been done to the enemy by their constant bombing raids." This report was now considerably amplified by a long and detailed account from Reuter's correspondent with the East African Forces.

"From the occupation of Moschi," he said, "to the enemy's final retreat from Kahe the aviators were busy bombing and reconnoitring. On March 24 (1916) Major W——, who had been delayed in South Africa by illness, took command. Then the rain came, and the squadron went into quarters at Mbuyini, and got overhauling its machinery in the light of the local conditions already gained. On May 9 Lieutenant B——, with General H—— as an observer, traversed the Pangani River. The month, as a whole, was devoted to hard work assembling new machines and correcting the errors of the old. On the 22nd the Corps said good-bye to Kahe and the advance commenced. Next day gallant S——, testing a new Henri Farman, crashed to earth, and was picked up as much a wreck as his machine. His brother pilots think he fainted in the air; they know of no other way to account for the sudden dip which his machine took. Captain O'B—— was missing at the time, and it was with intense relief that he was greeted on his return on foot. Fever now laid its hand upon the Corps, and quinine was scarce. Still the Flying Corps worked and scattered bombs about Handeni.

"The Intelligence Department put on record the fact that the actual effects of our bomb raids were of incalculable value in destroying the *moral* of the enemy. During the month of

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July the main body lay at Msiha under the galling shell fire of the enemy, and it was with sheer delight that we witnessed the air raids upon his camp at Ruhungu.

"The picture had its reverse side. The air raids inflicted heavy loss upon the enemy's infantry, but as soon as the planes had disappeared the enemy manned his guns and took it out of us.

"It was in July that the pilot T—— experienced a forced landing, the crash rendering him unconscious. When he came to, he found in the neighbouring kraal a native who spoke English, and with this man's assistance was able to get to Handeni; but the native paid dearly for his simple act of kindness, for a German patrol visited his kraal afterwards and hanged him, together with three of his companions.

Summer and Autumn Developments

"The work of the Corps at this time was very difficult. There was no opportunity of building an aerodrome close to the fighting line, and the planes had to traverse great distances to get at the enemy. The country, however, between our front and the existing 'dromes was so thick and heavily wooded that it was impossible to get any nearer. On August 7 the move against Ruhungu commenced, and great and ceaseless vigilance was required from the airmen. From being too far behind, the squadron got too far in front, and found itself in difficulties with its transport unprotected, and the fighting then a quarter of a mile away. Orders were consequently given for retirement to Turiana. In August Morogoro was visited for the first time by the 'birds,' and here the pilots received a warm reception. A naval gun mounted on a railway turntable made an excellent anti-aircraft weapon, but in the face of a storm of shrapnel fired from that and other guns, and some erratic attempts with rockets, the railways station and the enemy's military lines were successfully bombed.

"On August 1 one of the most successful of the bombing raids took place, five aeroplanes attacking the town and fortified camp of Ngulu Kwa Boga. Subsequent reports show that the enemy suffered heavily. Altogether the day should be written down most successful, and it added to the dread which the

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enemy already had of 'the birds that drop the eggs of death.'

"The squadron was next located at Morogoro, and the penultimate phase of the campaign had been brought to a conclusion. Its aircraft park was 350 miles behind it, and its advanced aircraft park 200 miles. Some concentration, therefore, appeared to be necessary, and that is now going on.

"The Flying Corps in East Africa has been of the greatest use from a military point of view. Indeed, without it the campaign must have been very greatly prolonged. While upon this subject it may not be inappropriate to point out how desirable it is that a unit of the Flying Corps should be permanently located in South Africa. We have a good start. It would be a pity to lose the peculiarly South African character of this unit, and we can only maintain that character by making South Africa its domicile and its recruiting ground."

On January 4 the aircraft patrolled the whole of the enemy's lines, dropping bombs and spotting for the artillery, while the communications were well maintained by telephone, telegraph and wireless. West of Pemea and Mohort, respectively, a strong enemy force was located by aeroplane on the 21st of the same month, on the south bank of the river.

A Gallant Rescue at Salonika

A gallant air rescue by one British pilot of another after the latter's machine had been brought down in the enemy lines was an outstanding event of the spring campaign in Salonika. Four enemy reconnaissance aeroplanes were shot down by the British anti-aircraft gunners in the first three weeks in January. On March 29 a tiny British squadron, greatly outnumbered, made a spirited sortie against a German squadron which was endeavouring to carry out a bombing attack on our communications.

At the beginning of April sadly needed new aircraft began to arrive at the Salonika front, and the daring quality of the airmen's work developed immediately. On Sunday, April 1, for the fifth time within a month, a squadron of German aeroplanes bombarded the hospitals at Exissou, despite the fact that the red crosses were visible from a long distance. Dead and

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wounded were reported among the patients and hospital staff, as well as among the wounded Bulgarian prisoners. Enraged at this cowardly attack, British airmen—a strong squadron of naval and military machines—on the 6th bombed the enemy aerodrome and ammunition dumps of Hudovo, descending to 400 feet to make sure of their aim. Fires were observed to break out, and considerable damage was inflicted.

The only other events of importance in this campaign in the period under review were the Allied raid on April 25 on an enemy depot at Cernista, causing considerable damage and subsequently dispersing an enemy squadron which was attempting to cross our lines. On May 10 no less than $1\frac{1}{2}$ tons of bombs were dropped with good effect by Royal Naval Air Service and Royal Flying Corps airmen on the enemy's tents, sheds, and transport. On the 28th co-operating squadrons again carried out a series of raids on Drama, where direct hits on the enemy's aerodrome were observed, also on Livunovo (north-east of Petile), and several places west of Lake Doiran. The feat of rescue had occurred the previous January.

Two British aeroplanes, which were sent out on reconnaissance, found, on arrival at their destination, that two hostile machines were patrolling along the place. Photography was nevertheless proceeded with. An engagement followed, in which the hostile machines were driven off. In the course of it Captain M——'s—all official records of the work of the air forces at Salonika at this period have been lost—machine was hit and he was forced to descend. He immediately burned his machine. The other machine (Captain F——) descended to the rescue. Captain M—— climbed on the engine cowl and the two pilots escaped. When the machine left the ground a large number of the enemy were running to it, the nearest of them being within 200 yards.

Macedonian Developments

Rather in the same neighbourhood, the Bulgarians, and the Rumanians alike, were busy with their aircraft. The former, as has already been stated, employed theirs for the most part in dropping propaganda, while the Rumanian Flying Corps, under the able tuition of British and French missions, was

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making its first appearance on the battle front. On February 28, for the first time in history, Rumanian war machines appeared in the skies, and successfully drove off two enemy aeroplanes which were manœuvring over their lines in the neighbourhood of Racoasa (on the Sisiitza). On March 13, in the Braila region, their aviators claimed their first aerial success, bringing down two Bulgarian aeroplanes in flames. Pilots of the French Aeronautical Mission co-operated with them at this early stage, carrying out a heavy and effective bombing raid of some enemy batteries on the surrounding hills. At the same time, Flight-Lieutenant Jacob of the British Mission was presented by Colonel Thomson, the British Military Attaché in Rumania, to the King, by the latter's express wish, to be decorated with the order of Michael the Brave, the highest that Rumania bestows, for his victory over a German machine, in a brilliant fight in mid-air, when he had succeeded in driving the enemy airmen down in flames. The King congratulated Flight-Lieutenant Jacob on his bravery, at the same time expressing his joy that an Englishman should be the first foreigner who had received this high order.

Bulgarian Aerial Tactics

"Because of the discontent of the people," ran the Bulgarian propaganda pamphlets, which were dropped by their airmen in the Serbian lines early in April, "with the British and French alliance, and also because of the ardent desire for peace, a revolution has broken out in Russia which has overthrown all the authorities and the Tsar."

To this the Serbian commanders replied in kind, with: "We are not unaware of the great changes in Russia, but also know what is hidden from you, that the changes are not the consequences of discontent with England and France, but of the hatred of the influence of Germany, which is now broken for evermore."

The Bulgaro-German authorities were at pains to distort the real significance of the portentous happenings in Russia, and consequently French aviators dropped fly-sheets with illuminating accounts of the revolution, at the same time calling on the Bulgarian people to imitate Russia's example and shake

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off the German influence which was leading the country to destruction.

Aviation in the Middle East

A shade farther to the east, according to their own claims, the Turks appeared to be making great use of their aircraft. According to Constantinople, on January 11, Sergeant Jopp succeeded in bringing down his sixth Allied machine in the neighbourhood of Kut El Amara. On the Dardanelles Front, the following month, another enemy aviator equally to distinguish himself was Lieutenant Mernike. On the 14th of the month this aviator was credited with bringing down a British machine, after attacking three, and capturing both the British officers who formed the crew. Three days later he brought down another of our aircraft, and again captured the pilot. Another of our machines, according to their showing, was forced to land inside the Turkish lines on the Sinai front on February 15. During his descent to the earth, the machine caught fire, but fortunately the pilot escaped unharmed. Later on, in March, another British aeroplane was brought down by the Turkish gunners, and "the observer, an Australian officer, taken prisoner." To this information the enemy added a post-script that: "The machine, which was but slightly damaged, is in our possession."

Between May 6 and 9 aerial activity with the Turkish pilots developed greatly. Six of the enemy aeroplanes, piloted throughout by German aviators, dropped bombs on one of our headquarters and one of our aerodromes. This raid, alike in numbers of aircraft employed and nature of objectives, was repeated the following day. Five further machines on the 8th, "attacked an enemy aerodrome and dropped bombs—some hundreds of kilogrammes in weight. A fire was observed to break out on the aerodrome as the result of several hits. In spite of the violent fire of anti-aircraft guns our machines returned safely."

It can hardly be said that the enemy aviators were possessed of unusually sharp eyes, or that their observational powers were the last word with regard to accuracy. They certainly did bomb the British camp on the date stated; but it was two

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field hospitals they succeeded in hitting—causing several deaths amongst the helpless wounded—rather than an aerodrome. Perhaps, with this knowledge, and the added prickings of conscience, the enemy commanders took it upon themselves a little later to report of a British raid, that : “Enemy aeroplanes attacked an open town and dropped bombs on the inhabitants, against whom they also opened machine-gun fire, unfortunately killing some women and children and wounding others.” Here again, the Turkish observational powers can only be described as unusual. The objective attacked by our aviators on this occasion was an enemy military camp marooned far out in the midst of the desert !

CHAPTER XI

ENEMY AIR SERVICE DEVELOPMENTS

The Two von Richthofens—Death of Hawker, V.C.—Personal Story of Richthofen the Great—Impressions of Early Career—Richthofen on his Foes—German Mastery of the Air—German Aircraft Losses in 1916—Vital Causes of the German Superiority—Unusual Rate of Fire of New Mechanism—German Aerial Propaganda—Early German Bombing Raids—March Manœuvres—Capture of Prince Friedrich Karl of Prussia—Great Enemy Air Victories—Raids and Counter-raids—Von Hoepfner on the British—Death of Count Zeppelin.

"THE two Richthofen brothers were here a short time ago. The elder has brought down in air fighting some sixty enemy air-men, the younger 'only' some thirty. The elder has a face like that of a young and pretty girl"—a characteristic equally applicable to Ball and Bishop. "He told me 'how it is done.' It was, he said, quite simple; all you had to do was to get quite close to your opponent from behind and then shoot hard; the other fellow would then drop. But you had to overcome your own 'funk,' and fly quite close up to the enemy. Modern heroes!

"Two good stories were told about the two Richthofens. The English had set a price upon the head of the elder. When he heard of this he informed them by means of leaflets from the air that, in order to facilitate their task, from the next day forward his machine would be painted bright red, so that they might the more easily recognise him. Next morning, when the squadron came out of its sheds all the machines were bright red—One for all and all for one! (Incidentally this is how von Richthofen the elder first earned his title of the "The Red Air Fighter.")

"The second story. Richthofen the younger and an Englishman were circling round each other and firing like mad at each other. They were getting closer and closer, and already they

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could distinguish each other's features. Suddenly something jammed in Richthofen's machine-gun, and he could not fire any more. The Englishman looked wonderingly across, and when he realised what was the matter with Richthofen he waved his hand, turned round, and flew off. Fair play! I should like to meet this Englishman and tell him that, in my eyes, he is greater than the heroes of old."

The above is culled from the leaves of Count Czernin's diary, written at Brest under date of February 2, 1918. It is interesting as lifting the veil, even if by so little, of a great personality, whom of all the enemy airmen in the war was most respected—and feared—by Allied aviators. It is even more interesting in its revelation of one of the most dramatic stories of the war in the air concerning the greatest of the early British "aces," Major Lanoe Hawker, V.C., D.S.O. He was the man who waved his hand and flew away.

Death of Hawker, V.C.

Hawker the chivalrous himself was to fall a victim to the deadly marksmanship of the elder, and more famous, von Richthofen. The latter describes the incident in his own book of reminiscences as follows: "One day I was blithely flying to give chase when I noticed three Englishmen who also apparently had gone a-hunting. I noticed that they were interested in my direction, and as I felt much inclination to have a fight I did not want to disappoint them.

"I was flying at a lower altitude. Consequently I had to wait until one of my English friends tried to drop on me. After a short while he came sailing down"—Major Hawker at this time was flying a single-seater de Havilland II biplane, with a 100-h.p. Monosoupape engine—"and wanted to tackle me in the rear. After firing five shots he had to stop, for I had swerved in a sharp curve.

"The Englishman tried to catch me up in the rear while I tried to get behind him. So we circled round and round like madmen after one another at an altitude of about 10,000 feet.

"First we circled twenty times to the left, and then thirty times to the right. Each tried to get behind and above the other.

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"Soon I discovered I was not meeting a beginner. He had not the slightest intention to break off the fight. He was travelling in a box which turned beautifully. However, my packing-case was better at climbing than his. But I succeeded at last in getting above and beyond my English waltzing partner.

"When we had got down to about 6,000 feet without having achieved anything particular, my opponent ought to have discovered that it was time for him to take his leave. The wind was favourable to me, for it drove us more and more towards the German position. At last we were above Bapaume, about half a mile behind the German front. The gallant fellow was full of pluck, and when we had got down to about 3,000 feet he merrily waved to me as if he would say: 'Well, how do you do?'

"The circles which we made around one another were so narrow that their diameter was probably no more than 250 or 300 feet. I had time to take a good look at my opponent. I looked down into his carriage and could see every movement of his head. If he had not had his cap on I would have noticed what kind of face he was making.

"My Englishman was a good sportsman, but by and by the thing became a little too hot for him. He had to decide whether he would land on German ground or whether he would fly back to the English lines. Of course, he tried the latter, after having endeavoured in vain to escape me by loopings and such tricks. At that time his first bullets were flying around me, for so far neither of us had been able to do any shooting.

"When he had come down to about 300 feet he tried to escape by flying in a zigzag course, which makes it difficult for an observer on the ground to shoot. That was my most favourable moment. I followed him at an altitude of from 250 feet to 150 feet, firing all the time. The Englishman could not help falling. But the jamming of my gun nearly robbed me of my success.

"My opponent fell shot through the head 150 feet behind our line. His machine-gun was dug out of the ground, and it ornaments the entrance of my dwelling."

It is this same book of von Richthofen's which gives us the clearest and most accurate insight into the conditions prevailing

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in the enemy air service at the time. If excuse is needed for borrowing so much from the pages of a dead foe, it may be said that, only from this source is it possible to obtain anything like reliable facts.

Personal Story of Richthofen the Great

The name of von Richthofen—Captain Baron Manfred von Richthofen—first appeared in the German *communiqués* on February 15, 1917, when, as a lieutenant, he was claimed to have won his 20th and 21st victories in the air. By April 9 he was credited with forty; on September 4 with 61; and on March 7, 1918, with 70. It was claimed by the Germans that, on April 28, 1917, he shot down 5 enemy machines. He was appointed commander of the 11th squadron after he had brought down his 16th machine in the beginning of 1917, and two days later he was decorated with the *Ordre Pour le Mérite*. "A telegram from headquarters arrived," he says in his book. "It stated that His Majesty had graciously condescended to give me the Order. Of course my joy was tremendous." On the occasion of his 50th victory he received a letter from the Kaiser, and during the last month of his life he was given the Order of the Red Eagle with crown and swords.

It was due to his restless spirit that von Richthofen took to the air. The weariness and boredom of trench warfare and its attendant stagnation palled upon his ardent nature. In the long-drawn-out battle of Verdun he is frankly ashamed of himself; ashamed of his "soft job" as despatch rider—"base-hog" as the German infantry contemptuously styled it. He joined the Flying Service at the end of May, 1915. "My greatest wish was fulfilled," he gleefully admits.

In October of that same year von Richthofen first met Boelcke, the earliest of the German "aces," whose greatest admirer and most apt pupil he was destined to be. "We were to be combined in a fighting squadron and took train on the 1st October, 1915.

"In the dining car, at the table next to me, was sitting a young and insignificant-looking lieutenant. There was no reason to take any note of him except for the fact that he

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was the only man who had succeeded in shooting down a hostile flying-man, not once but four times. His name had been mentioned in the despatches. I thought a great deal of him because of his experience. Although I had taken the greatest trouble I had not brought an enemy down up to that time. At least I had not been credited with a success.

"I would have liked so much to find out how Lieutenant Boelcke managed his business. So I asked him: 'Tell me, how do you manage it?' He seemed very amused and laughed, although I had asked him quite seriously. Then he replied: 'Well, it is quite simple. I fly close to my man, aim well, and then of course he falls down.' I shook my head and told him that I did the same thing, but my opponents did not come down. The difference between him and me was that he flew a Fokker and I my big fighting machine."

Richthofen's Early Career

Rapid and unusual, as was only to be expected, was von Richthofen's period of training as an aviator. In August, 1916, he again met Boelcke; not indeed longer as a shy and modest recruit, but as an airman proved, with many victories to his credit—still, however, possessing that almost veneration of the master hand. This time it was on the hot sandy flying-ground at Kovel that the meeting took place. "To-day the great Boelcke is coming on a visit to us," the rumour went round. He was just returned from Turkey; was on his way to Headquarters; and, what was vastly more interesting to the young von Richthofen was the fact that the great man was recruiting likely new blood for the fighting squadron he was about to organise on the Somme front.

"I did not dare to ask him to be taken on," says he. "I did not feel bored by the fighting in Russia. On the contrary, we made extensive and interesting flights. We bombed the Russians at their stations. Still, the idea of fighting again on the Western Front attracted me. There is nothing finer for a young cavalry officer than the chase in the air.

"The next morning Boelcke was to leave us. Quite early somebody knocked at my door, and before me stood the great man with the *Ordre Pour le Mérite*. I knew him, but still

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I had never imagined that he came to look me up in order to ask me to become his pupil. I almost fell on his neck when he inquired whether I cared to go with him to the Somme." But a couple of months later the personality of the protégé began to dominate the German air service on the Western Front; not directly, but in that queerly intuitive fashion peculiar to the far-flung battle-lines of the sky, where an aviator but rarely glimpsed his opponent's face, never heard his voice, yet recognised him as surely by some characteristic in the method of the handling of his machine as by personal acquaintance. On the battlefield of the Somme in those last months of 1916 it had become a question whether the mantle of Elijah already had not fallen upon the shoulders of Elisha. Boelcke, Richthofen, which was the greater? All doubt—any possibility of ill-feeling—was removed by Boelcke's death on the 28th October, 1916, in the Somme Valley.

Irony of fate! It was of this same battle-torn area that the fallen man had once said, "It is the El Dorado of the flying man." In this same sector, a couple of years later, Richthofen was to follow him to his death. Meanwhile, it was to prove for him more than a happy hunting-ground; starting him upon that career admitted by foe and friend alike the greatest of any aviator in the war.

"On the day when Boelcke fell," von Richthofen, while paying tribute to the memory of his fallen leader, at the same time points the great advance in the standard of German war aviation, "the squadron had brought down forty opponents. By now the number has been increased by more than a hundred. Boelcke's spirit lives still among his capable successors."

Richthofen on his Foes

Throughout those spring months of 1917, at the time when the enemy air service was at the height of its prowess and efficiency, von Richthofen and his squadron encountered innumerable French and British pilots alike. The German freely expresses his opinion of the merit of both with an infallible belief in the superiority of his own side, which furnishes one of the most useful enemy psychological studies of the war in the air. "Everything," he says, in claiming for Germany the

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undoubted superiority in the air, "depends on whether we have for opponents those French tricksters or those daring fellows the English. I prefer the English. Frequently the daring of the latter can only be described as stupidity. In their eyes it may be pluck and bravery.

"The great thing in air fighting," he continues, "is that the decisive factor does not lie in trick flying but solely in the personal ability and energy of the aviator. A flying man may be able to loop and do all the tricks imaginable and yet he may not succeed in shooting down a single enemy. In my opinion the aggressive spirit is everything, and that spirit is very strong in us Germans. Hence we shall always retain the domination of the air (*sic!*).

"The French have a different character. They like to set traps and to attack their opponents unawares. That cannot easily be done in the air. Only a beginner can be caught, and one cannot set traps, because an aeroplane cannot hide itself. The invisible aeroplane has not yet been discovered. Sometimes, however, the Gallic blood asserts itself. The Frenchman will then attack. But the French attacking spirit is like bottled lemonade. It lacks tenacity.

"In Englishmen, on the other hand, one notices that they are of Germanic blood. Sportsmen easily take to flying, but Englishmen see in flying nothing but a sport. They take a perfect delight in looping the loop, flying on their back, and indulging in other tricks for the benefit of our soldiers in the trenches. All these tricks may impress people who attend a sports meeting, but the public at the battle-front is not so appreciative of these things. It demands higher qualifications than trick flying. Therefore the blood of English pilots will have to flow in streams."

German Mastery of the Air

It is hard, and as far as the English are concerned at least, in some cases, unjust criticism. Our airmen did not behave in the foolishly vain fashion suggested by von Richthofen; and indulge "in other tricks for the benefit of our soldiers in the trenches." Considering that at this time there was a grave shortage of machines on our side capable of performing such

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manceuvres as he outlines, his teutonic frankness may be taken with a grain of proverbial salt. But to come to facts. There is no denying that in the spring of 1917, and far on into the summer, the German aviators held an undoubted mastery of the air on the Western Front. Even after diluting their own claims, which frequently were exaggerated in the most childish fashion, the balance in favour is well in their hands.

Perhaps the most useful criterion of this argument is to be found in a semi-official German *communiqué*, published early in January, which dealt with the matter of their gains and losses the previous month of December, 1916, and, in fact, for the whole of that year. Sixty-six Allied machines, they claim, were shot down by German agencies in the month of December, as against 21 German machines destroyed by the Allies. The total number of victories claimed by German aviators and anti-aircraft artillery during the whole of that year was 784. While their own losses during the same period were estimated at only 221. Of this total no less than 739 Allied and 181 German occurred on the Western Front. "These figures," the semi-official continued, "furnish striking evidence as to who is the stronger in the fight. In spite of the numerical superiority (?) of our enemies our aviators have succeeded, by their skill and fighting spirit, in clearing the air above our own troops from enemy aviators. Rarely and only in strong squadrons does the enemy venture over our front, to drop his bombs at random as soon as German aeroplanes approach to chase off the intruder."

Month by month these comparative losses were set out as follows: January, 20; February, 23; March, 49; April, 36; May, 47; June, 43; July, 85; August, 84; September, 133; October, 104; November, 94; December, 66. While German losses during the respective months were claimed to be: 5, 8, 19, 24, 16, 10, 23, 24, 23, 17, 31 and 21.

The only reliable check we have on these figures is a secret report of the French Intelligence Service, which states that the Germans during 1916 lost, not 221, but as many as 417 machines. Of this total, 2 German machines were lost in January, 17 in February, 22 in March, 27 in April, 41 in

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May, 18 in June, 49 in July, 49 in August, 70 in September, 41 in October, 39 in November and 42 in December. This total is definitely known to have been destroyed, while 105 were damaged, and also 20 German kite-balloons were shot down.

Set side by side in tabular form these rival claims of losses offer amusing reading :

GERMAN MACHINES LOST IN 1916				
<i>German Estimate</i>		<i>Month</i>		<i>French Estimate</i>
5	..	January	..	2
8	..	February	..	17
19	..	March	..	22
24	..	April	..	27
16	..	May	..	41
10	..	June	..	18
23	..	July	..	49
24	..	August	..	49
23	..	September	..	70
17	..	October	..	41
31	..	November	..	39
21	..	December	..	42
Total 221			Total 417	

At the same time, the semi-official German announcement was accompanied by the diagram printed on p. 177. The number of enemy machines shot down during the month is given over each column, the number of our machines actually captured, below. The black colouring in the columns indicated the Allied planes in German hands; that with straight upright lines alone, Allied machines alleged to have been destroyed by the Germans; with upright and horizontal, German machines captured by us; while the blank white space is intended for the German machines destroyed by the Allies.

Despite these conflicting estimates, as has been stated already and as the Allied air commanders were the first to admit, the Germans held a very marked superiority in the air at this time. If the reason were demanded for this mastery it could be supplied in two words—superior marksmanship. Sufficient cannot be said of the value of the machine-gun, and the skill

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of the man who handled it, in the aerial combat. It was the deciding factor then and all the time. Ball, Bishop, Fonck, Guynemer, von Richthofen were not so much trick pilots as they were, every one of them, crack shots.

The enemy had given particular attention to this phase of

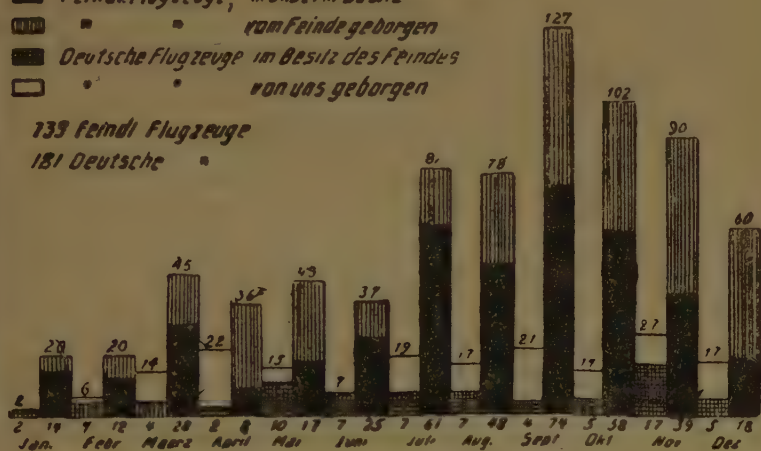
Darstellung der im Jahre 1916 an der Westfront abgeschossenen Flugzeuge

733:181

- Feindl. Flugzeuge, in unserm Besitz
- vom Feinde geborgen
- Deutsche Flugzeuge im Besitz des Feindes
- von uns geborgen

733 Feindl. Flugzeuge

181 Deutsche



Die über den Flächen stehenden Ziffern bezeichnen die Gesamtzahl der in diesen Monaten abgeschossenen Flugzeuge.

Die Ziffernreihe unter den Flächen gibt die Zahl der tatsächlich erbeuteten Flugzeuge an.

A German diagram of air losses, described on the opposite page.

air warfare. Every one of their aviators had to undergo a long and intensive course, and pass a stiff examination in gunnery before they were permitted to proceed to the fighting lines.

About this time the Germans had first brought into use an invention which completely revolutionised fighting in the air. This was a system by which it was possible to fire a

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steady stream of bullets between the blades of an aeroplane propeller while in motion.

The first move of the Fokker pilot after engaging with an Allied airman was to settle on a certain line of flight and then lock his elevator control by means of a lever, by which he was enabled to steer right or left by the action of his feet on the rudder bar and maintain lateral balance by moving the control post with his knees; but he had to continue the flight in the same line until the elevator was again freed. This procedure permitted the airman to use his hands, since they were no longer required on the controls.

The machine-gun of the Fokker was of the Maxim type, and was immovably fixed above the engine cowl and slightly to the right, so that its line of fire passed through the path of the revolving propeller in front. In sighting his gun the pilot manœuvred his aeroplane until the sight registered on the target. This business called for a high degree of skill, for both the firing medium and the target were mobile, while the flying of the machine was accomplished by relatively slow movements of considerable amplitude.

Instead of the machine-gun being fired by pulling the trigger, as in usual practice, the trigger was operated by a cam and transmission mechanism under the control of the pilot. On the revolving shaft of the rotary engine was a disc carrying a slight bulge at one point whose relation was at right angles to that of either propeller blade. On the disc rested a small wheel which received the reciprocating movement brought about by the use of the cam member. The reciprocating movement was transmitted by a system of levers and springs. Normally, when the gun was not firing, the reciprocating movement ended two-thirds of the distance along the barrel of the gun; but at the moment the pilot was ready to fire the gun he pressed a small lever, fixed in the centre of the steering bar control, which, by means of Bowden wire and sundry connections, acted directly upon the trigger of the gun.

Unusual Rate of Fire of New Mechanism

The action of the firing mechanism was to pull the trigger of the gun once for every revolution of the engine and pro-

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pellor, at the moment when neither of the two propeller blades was in the line of fire, in spite of the high rate of revolutions of the propeller, which normally reached some 1,200 r.p.m., or 20 revolutions per second. Since the average machine-gun fired anywhere from 400 to 600 rounds per minute, or 6 to 10 per second, the opportunity to fire 20 times each second was ample for the proper functioning of the gun when the engine was turning over at the usual speed. The cartridges were fed into the gun from the belt magazine, the empty shells being ejected through a tube, which passed through the wall of the fuselage, while the empty belts were deposited in a container.

German Aerial Propaganda

The Germans commenced the year in characteristic fashion by issuing wholesale lying propaganda of a British attempt to bomb neutrals in the Mediterranean. The matter arose from the expulsion of the German, Austrian, Turkish and Bulgarian minister plenipotentiaries from Athens. Said a German Wireless Press message of January 3: "The American Government is raising a protest to Great Britain for allowing British airmen to bombard the station of Drama before the ejected delegates and Consuls had left, in face of the airmen's knowledge that the delegates had to be met at the station. This bombardment, *which, of course* (the italics are the Germans' own), *was useless*, is the latest case in the history of the breach of international law by the alleged protectors of smaller nations."

Now for the other page of the story. The German official, which was timed most skilfully, was but another undeniable example of the subtle methods of the enemy propagandist. Yet it was refuted in every word in a single announcement from the British Admiralty of the following day. This announcement explained how when the enemy ministers, who should have been sent about their business long before, were expelled from Athens, they "were sent at their own request, together with their families and servants, by specially chartered steamer to Kavalla. After being landed a request from the German Minister was conveyed to the Thasos air station asking that

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the Drama-Kavalla road might not be bombed for twenty-four hours from 6.45 A.M. on November 25, as it was being used by women and children belonging to the evicted enemy Legations.

"The Commanding Officer of Thasos air station," the Admiralty report continued, "not only complied with this request, but, as a further act of grace, refrained from any operation against Drama station and aerodrome until the 28th, when both were bombed with effect. The only attack made on the 25th was on the Drama aerodrome alone, and was carried out before the message from the German Minister reached the Allied air station at Stavros. No bombs were dropped in or near the town nor in the vicinity of either the station or the Drama-Kavalla road. This report was substantiated by photographs." Really, under the existing circumstances, this clumsy, lying story was unnecessary, and only did more harm to the enemy cause than good; further alienating the feeling of the neutral Powers.

Early German Bombing Raids

At the actual battle front the enemy made a far better show during those early months of 1917, and turned his time to good purpose in carrying out a series of intensive bombing raids on the Allied military positions. During January they claimed that their airmen, in spite of the bitter cold, carried out important tasks of observation, reconnoitring and attack, with a loss of 34 machines. While the British, French and Russians lost altogether 55 aeroplanes in air fights or shot down from the ground, of which 29 were observed to be brought down within our lines, while 26 fell into German hands. In addition they claimed to have brought down three of our kite-balloons in flames, without loss to themselves in the same class of aircraft.

At the beginning of February, when the Rhine towns began to suffer at the hands of the Allied airmen, the enemy took the truly teutonic method of revenge by placing a large number of distinguished English and French officers in a concentration camp in an exposed district of Karlsruhe—which town had been visited most frequently by our airmen—as a guarantee against

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further aerial bombardments. At the same time our raids upon Munich occasioned a great deal of anxiety in Bavaria, causing the War Minister to issue a statement that the whole defence of Bavaria against air attacks was now as complete as human power could make it, and that the population could therefore be entirely easy. Which, after all, and as future events were to show, did not reveal German limits of human power to the very best advantage.

On February 3 several of their Flanders naval aeroplanes bombed Dunkirk and Furnes, at the latter of which towns the Belgian Flying Corps at this time was situated. The town of Dunkirk and its adjacent aerodrome at St. Pol was again visited by the enemy airmen on the night of the 9th-10th. While on February 16 the Germans reported: "Naval aeroplanes on the evening of February 14 again successfully bombed the aerodrome at St. Pol, near Dunkirk. Hits and a conflagration were observed in the airsheds. On the return flight near Dunkirk the aviators observed the reflection of a fire, which was visible for a great distance. All of our aeroplanes returned undamaged.

"The reciprocal aerial activity was very lively throughout the night and day. The enemy lost 7 machines in aerial combat.

"Again last night the German aeroplanes dropped bombs on the aerodromes at St. Pol, near Dunkirk, and Coxyde. Hits on the buildings and aerodrome plants were observed."

Strangely enough the Germans still persisted in carrying on their absurd aerial propaganda campaign hand-in-hand with some really very fine spells of aerial offensive activity. On the 7th February, for instance, a small German balloon, to which there were attached 50 newspapers printed in the French language, fell on the trees near the Petit Palais, in the Champs Elysees of Paris; this childish enemy effort being treated by the French population with the utmost amusement.

At the same time von Richthofen had begun to lead his famous squadron on from one victory to another. On February 14, according to the German report, when "the clear atmosphere favoured air activity from the Channel to the Vosges,"

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the great German "ace" gained his 20th and 21st victories over Allied machines. On the 6th of the month the enemy headquarters made a curious omission, which they made good the day following with their usual bluster and lies. The first day they admitted that our bombing airmen had caused a fire in Bruges. While on the morrow they strove strenuously to prove that all that was destroyed was "some houses," where the Allied airmen "killed one woman and sixteen children in a school and seriously injured two adults. No damage was caused to military establishments." Yet another French Intelligence report proves this announcement incorrect in every detail. No school in the town was bombed, and only a large military shed, employed for storing blankets, was hit. These incidents throughout disclose the childish cunning and stupidity of our enemies.

February for the Allies was marred and a glorious triumph gained for the Germans in the tragic mishap to a French airship on the night of the 23rd-24th. The French airship was brought down in flames in the wood east of Saarlautern by enemy anti-aircraft fire. The moment that it touched the ground all the ammunition aboard blew up. All of the crew, numbering fourteen, were instantly killed.

The March Manœuvres

March, and again there was renewed activity on the part of the enemy air service. The German aviators redoubled their efforts; the von Richthofen squadron reaching the summit of its glory. On the 4th the Germans claimed to have brought down no fewer than 18 Allied machines, to a loss of four of their own. Fifteen more they claimed the following day; and on the 7th their bombers having derailed a Russian train between Vileyka and Molodeczno. Their claims for the month throughout were considerably greater than in February, when, according to their own account, the Allies in the West, the East and in the Balkans lost 91 machines, of these they captured—again, according to their own version—37; 49 were seen to fall behind our lines, and 5 Allied machines were forced to land.

Von Richthofen scored his 25th success in air fighting on

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the 9th of the month, and five others in the next three weeks; bringing this total up to 30 by March 24.

This month the Germans paid special attention to their construction of new aircraft. Tremendous efforts were concentrated on increasing the flying material. By means of a system of standardising of parts a tremendous number of new machines were turned out. And, whatever the proportion might have been of available stocks, a large number of the older types about this time were voluntarily withdrawn from the Western Front.

On the 22nd of the month it was reported that: "the aeroplane piloted by Prince Frederick Karl of Prussia which went for a flight over the enemy lines between Arras and Peronne, has not returned." According to the German story, the Prince accompanied one of their crack military pilots, Fritz Mannschott, in a flight over the lines.

North of Bapaume the squadron sighted some enemy aeroplanes belonging to a squadron of one-seaters. In the ensuing battle, concentrated fighting by the squadron was impossible owing to the numerous clouds; the Prince, who was flying in the rear, became engaged in an air battle unnoticed by the others, and his aeroplane was only seen when descending in steep spirals. It was then 600 feet from the ground and any assistance was impossible.

The aeroplane landed close to some Allied troops near Lagnicourt-Vaulx, and the Prince, apparently wounded, was removed from his aeroplane and carried away by some soldiers who had hurried to the scene.

Afterwards it was discovered that the Prince had been captured by Australians. It appeared that he was overtaken by a British pilot in mid-air who was returning from a night bombardment. A machine-gun duel took place at a height of about 6,500 feet. The reservoir in the Prince's machine commenced to leak and the plane dived slowly towards the earth. Several soldiers were the only spectators of the descent and saw a tall young man leaving the machine. Without taking the precaution to burn the aeroplane he began running at full speed across the fields, attempting to escape. The British soldiers shouted "Stop!" but the Prince continued to run.

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Then an advanced-post sentinel in a crater fired two rifle shots, twice wounding the Prince, who fell hit in the heel and the chest shouting "I am Prince Frederick Karl." Ambulance men carried him to a dressing station, and papers found left no doubt as to his identity. The Prince remained in the hospital where he died a few days later.

Great Enemy Air Victories

During the month of April the Germans claimed to have brought down no fewer than 362 Allied aeroplanes and 29 captive balloons. Of the former, 299 were brought down in aerial battles. On the other hand the enemy admitted a loss of 74 aeroplanes and 10 captive balloons. "The past month," they stated, "has shown the German aerial fighting forces at the zenith of their capacity. Whilst our defensive means were successfully occupied in warding off ruthless enemy bomb attacks on the Fatherland, the heavy April fighting made the highest demands on aviators, captive balloons and anti-aircraft guns in the field. In co-operation, which daily grew more intimate, they showed themselves equal to their tasks, and our bombing squadrons destroyed important military establishments. Our aerial reconnoitring operations brought valuable information to headquarters. The self-sacrificing co-operation of our aviators on the battlefield has supported in an exemplary manner the heavy infantry and artillery fighting."

It must be admitted that the Germans realised almost this not too modest claim. The Richthofen Squadron, on April 6, was responsible for an unusually fine piece of work. A British flight of four machines which had flown over as far as Douai, was trapped and destroyed in its entirety. Two of these were claimed by von Richthofen himself, who now brought his total up to 36 Allied machines which he had destroyed.

By a well-organised general reconnaissance movement the following day the whole of the Allied position, batteries, ammunition dumps and works of fortification in Rheims, together with reserve lines and trenches behind the city were examined. Photographs were obtained of all these positions, and the German heavy artillery immediately directed thereon. On the

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same day the Germans claimed that we lost 44 aeroplanes, 33 in aerial engagements, 8 by anti-aircraft fire and 3 by forced landings behind their lines.

On top of this, on the 8th, they issued another statement that "The anticipatory development of our aerial fighting forces, the perfection in the building of aeroplanes on the basis of experience gained from the enemy and at home, the tutoring of observers for artillery and infantry, and the maintenance of the established attacking spirit of our fighting aviators have led to great results during March. In securing these remarkable results our anti-aircraft guns also played a very considerable part.

"Our opponents, including the Americans who were in the French aerial service a long time prior to their country's declaration of war, have lost in the West, East and in the Balkans 161 aeroplanes and 19 captive balloons by our attacks and anti-aircraft devices. Of these, 143 aeroplanes and the 19 balloons were shot down in aerial attack and 15 aeroplanes were shot down by fire from the ground. Three enemy aeroplanes came into our possession by involuntarily landing behind our lines. The German losses amount to 45 aeroplanes. No captive balloons were lost."

Raids and Counter Raids

In the morning of April 10 a German battle squadron dropped 3½ tons of bombs on Allied barracks and an encampment near Fismes and Bazoches. Also it was announced: "Flight Commander Robinson was shot down by a German battle aviator." Unhappily for poor Robinson, who had so recently been awarded the V.C. for bringing down the German Zeppelin near Cuffley, the subsequent imprisonment following his capture was to cost him his life; he died in 1919 from pneumonia, largely as a result of his ill-treatment while in the enemy's hands.

Between the 13th and the 22nd the Germans put in the heaviest spell of work of the whole spring. On the entire front, but principally in the battle sectors, there was increased air activity. In ten days of aerial combat the Allies lost no fewer than 97 machines to German aviators. The highest

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daily total of these losses was that of the 13th, when the enemy shot down 24 aeroplanes and 4 captive balloons. Of this total von Richthofen's squadron alone claimed 14, of which the leader himself accounted for 3 and Lieutenant Wolff for 4. The following day, the 14th, for the first occasion in the war, the Germans referred to the Americans as a national unit participating in the war. "The French, British and Americans," they stated, "lost 17 machines in aerial engagements." Von Richthofen this day gained his 44th; and on the 22nd, his 46th victory; bringing the total of his squadron up to 100 Allied machines.

It was shortly after this that von Hoppner, the C.-in-C. of the German air service, interviewed by a journalist, gave utterance to his famous and condescending statement that: "The English show in air fights that they are of the Germanic race, for they seek fight, and fight until either they or their opponents are killed. German aircraft generally are better than those of the enemy, though the new Sopwith triplanes are excellent . . . While we Germans consider every flight as a military act, for the British flying is but sport, and when it comes to a fight, good sport. The German is a soldier first. Our German military training cannot be outdone by Britain's three years' war training. Every one of our fliers hopes to be a Boelcke, and their comrades' deaths do not frighten them."

Death of Count Zeppelin

Undoubtedly the most important—though unconnected in any way with the actual battle front, a moral reverse of some consequence—event of the German spring air campaign was the death (March 8) of that indefatigable aviation pioneer, Count Zeppelin. The Count retired from the German army in 1891 with the rank of General of Cavalry, and began to devote himself seriously to the construction of giant airships. His romantic history was already too familiar before the war to need repetition in these pages. By 1913, suffice it to say, he had laid down a fleet of some ten vessels, and at the outbreak of the war was the greatest hero in the enemy's country.

CHAPTER XII

MESSINES RIDGE

Standards of Comparison—Four Weeks of British Aviation at Messines Ridge—Reaction—Russian Revolution—British Plans—Preliminary Stages of the Battle—A Brave Deed—The Air Battle Continues—Personal Aspects of the Air Battle—A Fight to a Finish—Honours of the Royal Flying Corps—Further Progress in the Air Battle—Return of von Richthofen—British Aerial Offensive—Seven Days of Battle in the Air—Adventures of a British Observer—Facts and Figures of the Air Battle—Summary of Six Months' Air Fighting.

It was a sure maxim of the late war that a German excuse invariably camouflaged a German defeat. In times of victory "the glorious troops of the Fatherland could do no wrong." From this standpoint, reading the two conflicting versions which appear on p. 188—the manly, sincere and straightforward version of the British Commander-in-Chief; the soldier's blunt story, with the considered scholastic report of the worthy Professor—we discover how very real was the defeat of the enemy aviators at the battle of Messines Ridge. There is an even more significant conclusion to be drawn.

Since late summer in 1916, as already has been pointed out in these volumes, the enemy aircraft had held an undoubted superiority on the Western Front. Their new types of machines were second to none; their aviators, led by the gallant von Richthofen, had proven themselves indomitable. Altogether it had proved a very trying time for the British air commanders. It can be imagined, then, how welcome to them must have been this first admission on the enemy's part that his much-vaunted aerial supremacy at last was being wrested from his hands. Professor Wegener excuses, he "protests too much." "We, on the other hand, fight them from the ground with rifle and machine-gun." There is little of the omnipotent German air service about that statement. In a word, the enemy aviators are no longer in the picture. They

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have been driven back by the desperate onslaughts on the part of our own airmen to regions far behind the battle areas.

Here are the two accounts printed side by side :

... "I desire to place on record here my deep appreciation of the splendid work done above and below ground, as well as in the air, by all arms, services and departments, and by the Commander and staffs, by whom, under Sir Herbert Plumer's orders, all means at our disposal were combined both in preparation and in execution with a skill, devotion and bravery beyond all praise . . . The great success gained has brought a long step nearer the final victorious end of the war, and the Empire will be justly proud of the troops who have added such fresh lustre to its arms."

(Field-Marshal Sir Douglas Haig, in his message of congratulation to the General Officer Commanding the Second British Army after the victory at Messines Ridge.)

... "The operations are prefaced by innumerable enemy airmen who, at the beginning of the preparations for attack, suddenly appeared here like a swarm of locusts and swamped the front. They also work on cunningly calculated methods. Their habit is to fly in three layers—one quite high and with their little machines almost invisible from the ground, one in the middle, and the third quite low. In this way they are almost always able to menace our airmen from several sides at once. Just as at the beginning of the battle of the Somme, the Englishmen who fly lowest show an immense insolence. They come down to 500 feet or even less from the ground, and shoot at our troops with their machine-guns, which are specially adapted to this purpose. We, on the other hand, fight them from the ground with rifle and machine-gun."

(An account of the battle of Messines Ridge, which appeared in the *Cologne Gazette*, June 20, 1917, written by Professor Wegener.)

In preparation for the great struggle at Messines Ridge a special concentration of British aircraft at home and in other sectors of the Western Front had been specially or-

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dered by Sir Douglas Haig on a front from Nieuport to St. Quentin.

Aircraft were to play an all important part in the general plan of the battle. By night they went far out, singly and by squadrons, over the enemy's hinterland, to bomb his lines of communication, and munition factories on the lower Rhineland; by dawn speeding over the slumbering lines, searching out the new dispositions of the enemy troops; later on photographing them, their billets, their staff headquarters and their heavy gun emplacements, lithe artillery machines would go abroad, hanging dangerously over the German anti-aircraft batteries, directing the fire of the British "heavies" on to his most assailable positions; at sunset and late afternoon going out to reconnoitre and photograph and bomb again. The days before the battle the artillery-direction pilots excelled themselves against the enemy targets. After forty-eight hours of such strenuous labours "the last remnants of Wytschaete had disappeared," says Colonel Buchan. "The woods on the slopes ceased to be tattered and became fields of stumps. In that hot, dry weather a cloud of dust hung all day long about the slopes, and at night they blazed like the boulevard of a great city. Our raiding activity was unceasing, and from the dazed prisoners and from many captured letters we learned of the misery of the enemy. Certain Irish troops made five distinct raids in forty hours. British aircraft spent their days over the enemy hinterland and prevented any enemy planes from learning the extent of our preparation. 'Our machines never even got so far out as their own front lines,' wrote a German officer. In one fight 5 British planes encountered 27 Germans, wrecked 8 and returned safely home. Between 1st June and 6th June we destroyed 24 enemy machines at the cost of 10 of our own. The air was full of the hum of our bombing and reconnoitring planes flying eastward, and our balloons were going up—tawny patches against the June sky. Then came a burst of German high explosives, and then, at precisely ten minutes past three, a sound compared to which all other noises were silence . . . From Hill 60 to the edge of Messines, with a shock that made the solid earth quiver like a pole in the

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wind, nineteen volcanoes leapt to heaven. Nineteen sheets of flame seemed to fill the world."

But to return a day or so, and to study the general influences which had led up to this great British attack. The British push for Messines Ridge, which was one of prime importance had as its objective no less ambitious a scheme than the out-flanking of the whole German defence system to the north, which at the same time would free the better part of Belgium from the hated German occupation; deprive the enemy of invaluable submarine bases along the coast, while crippling his lines of communication to the ammunition factories and depots of the Lower Rhineland. This scheme of operations had been receiving the closest detailed consideration of Sir Douglas Haig and his staff since the previous November.

Meanwhile, unexpected developments on other fronts had materially influenced the plans of the British C.-in-C. Time and again the enemy, who was anxiously apprehensive of the coming grand, had launched several ineffective counter-attacks, in the meeting and repulsing of which the British aviators had played a most conspicuous part. In his dispatch covering the period from November, 1916, to May 1917, Sir Douglas Haig speaks glowingly of this part played by the airmen; particularly their work in the month's fighting which ended in the capture of the Beaumont Hamel Spur. The excellence of the British artillery preparations and barrage he says, "were made possible by the opportunities for accurate observation afforded by the high ground north of Thiepval and by the fine work done by our aircraft." Again, referring to the evacuation by the Germans of their line Gueudecourt-Serre in February, he adds: "He (the enemy) was also materially assisted by a succession of misty days, which greatly interfered with the work of our aeroplanes." But all these minor operations pale to insignificance before the reactionary effects on the Western Front of the Russian débacle.

Reaction—Russian Revolution—British Plans

Instantly was released for service the entire German organisation on the Eastern Front: infantry, artillery, cavalry and aircraft in large numbers. The German reserve in the

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West was no longer in doubt. Now the enemy was enabled not only to resist any British attack, on however prodigious a scale, but also actually in a position to launch an offensive of the same nature. It behoved Sir Douglas Haig to strike before the enemy had time to effect this readjustment. Time pressed. Originally the British offensive had been planned for Midsummer. It was launched on the morning of June 7; and throughout the month, on the land and in the sky, the battle raged unabated.

In these four weeks the British aircraft performed prodigious feats in the skies. Though aerial operations on the whole were not on so widespread and intensive a scale as in April and May, before and during the battle of Messines Ridge, there were isolated days of fighting which were the bitterest and most intense of the war. The Germans lost no fewer than 282 machines during the month, the Allies 110. While these figures do not point to an overwhelming victory to our side, at least they give some indication that, at last, that fluctuating supremacy of the air was definitely ours. The superiority of the British airmen was very marked during June.

As against 230 German machines, of which 138 were destroyed by our airmen and anti-aircraft guns (the latter accounting for 11), 99 more were driven down out of control. Seven German machines fell in our lines. Including three machines which were brought down in May, but were not reported until June, the French, the same month, accounted for 48 German machines, 41 being destroyed and seven driven down.

Preliminary Stages of the Battle

"The very fine work of the R.F.C." was commented upon by the British Commander-in-Chief, in his dispatch of June 8, describing the taking of the Messines Ridge. It was due to their instrumentality, he continued, that so complete a success was gained. At the same time, he made the first official mention of squadrons of R.N.A.S. aviators co-operating with the R.F.C. on the Western front, and particularly throughout this battle:

"In connection with the recent offensive the pilots of the R.N.A.S. have shown energy, gallantry and initiative, and have

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proved themselves capable of standing hard work and hard fighting. Further, the machines with which they are provided have undoubtedly helped largely towards the success of the aerial fighting which has taken place this spring on the front of the British Armies in France."

It was a happy augury of the trial which was to come. During those strenuous days of preparation for the attack for Messines Ridge, the average number of miles flown by the combined forces of British airmen was over 60,000 a day. In five days, forty-four German machines were sent crashing to the earth. Our aviators, at this period, appeared to be moved by a spirit of splendid exaltation. They willingly dared every risk and danger; directing the fire of the British heavy guns from a dangerously low altitude, every time a German artilleryman was vain, or foolish enough, to reveal his position to the lynx-eyes of the prowling scouts overhead. Before the dawn on the opening day of the battle—June 7—very early, flocks of our machines swept out into the skies to blind the enemy's eyes and report the progress of the battle. As the result of their efforts at least one British aviator was accorded the unique honour of being mentioned in person in the French official *communiqué*.

A Brave Deed

This mention occurred in the *Journal Officiel*, and concerned Lieutenant K. P. Burburry, an observation officer employed with a captive balloon attached to the Fourth British Army. Therein it was explained that, his balloon having drifted towards the German lines, the cable having been cut by a shell, Lieutenant Burburry ripped it open at an altitude of 3,000 feet before throwing himself out in a parachute, and thus preventing a balloon of a new French type, now in use in the British Air Force, from falling into the enemy's hands.

Owing to the thundery weather of the days immediately preceding the battle, no work was possible with the aircraft; but it is surprising to find that the enemy knew beforehand the British plans, and were waiting prepared for our assault. "All the reserves of the divisions attacked (with the exception of the emergency garrisons)," ran an order from General von Laffert, the commander of the German 4th Corps, issued on June 1



Photos :]

[R.A.F. Official.

HOW KITE BALLOON PARACHUTES ARE WORKED

The inset photograph on the left shows a balloon coming down in flames. When this happens the observers must risk a parachute jump of some three or four thousand feet, or be burned to death. The big photograph shows how the parachutes are attached to the balloon. Two types are shown.

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"will be at the absolute disposal of those divisions for the purpose of repelling the attack. Plentiful and well-advanced fighting reserves of the Army Group will permit of the continuous bringing up of other divisional reserves for an immediate powerful counter-attack. . . . The absolute retention of the natural strong points of Wytschaete and Messines becomes of the utmost importance for the domination of the whole Wytschaete salient. These strong points, however, must not fall, even temporarily, into the enemy's hands. Both must be defended to the utmost, and held to the last man, even if the enemy has cut the connection on both sides and threatens the strong points from the rear. The troops must be told that we have very strong battle reserves close behind the front, which are destined to throw back any enemy who may have temporarily broken through, in our great counter-attack, should the battle reserves of the division not already have done so." It became the immediate business of the British aviators to seek out those "strong battle reserves," and deal with them effectively. How this work was carried out we shall see later in the chapter.

On June 2 occurred the first successful British attack near Lens. This was badly checked the day following, and the airmen began to get active. The air was unusually busy for twenty-four hours during the 4th; bombing raids were carried out both by night and day, eighteen German machines being brought down in this period by our airmen. In this manner the way was made clear for the infantry advance, and capture of German positions south of the Scarpe. This happened on the 6th, when there was again great activity in the air, many fights, and the British pilots encountered five large hostile formations of machines, one of which consisted of over thirty aircraft. This they attacked and drove off, bringing down nine German machines and driving down a similar number, to a loss of six British craft.

So came the early morning of the 7th. At midnight there broke a violent thunderstorm, with torrents of rain, which, falling on the hard-baked ground, caused great mists of heat to rise, enveloping the earth's surface as though in a shroud. For a time all aerial operations had to be abandoned. But at 2.30 A.M. the sky cleared, and again the British bombing

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machines swept out over the most wonderful panorama; the warm, moist and sweetened earth was bathed with a miraculous cleanness, that was touched faintly with the first streaks of the young dawn in the eastern sky. The aviators, however, had no time to admire the beauties of the scenery. Before them lay the sternest duties of the day. During the advance they co-operated with both infantry and artillery, performing valuable services. A large number of successful raids were carried out, during which the enemy's aerodromes, balloons, trains, billets, depots, and troops were attacked with bombs and machine-guns, the enemy pilots being prevented altogether from participating in the battle. We accounted for twelve German machines brought down and eight others driven down out of control, to a loss of fourteen of our own.

That is but a brief recital of facts. The deeds of our airmen that day made an epic. "A youthful madness took possession of them," says Mr. Philip Gibbs, who was present throughout the battle. "Those squadrons which I saw flying overhead, while it was still dark on Thursday morning, did dare-devil, reckless, almost incredible things. They flew as men inspired by passion and a fierce joy of battle. They were hunters seeking their prey. They were Berserkers of the air, determined to kill though they should be killed, to scatter death among the enemy, to destroy him in the air and on the earth, to smite him in his body and in his works, and in his soul by a terror of him. This may seem language of exaggeration, the silly phantasy of a writing man careless of the exact truth. It is less than the truth, and the sober facts are wild things. Early on June they were up and away, as I described them, passing overhead on that fateful morning before the crimson feather clouds appeared over the battlefields. They flew over the German railway stations far behind the lines and dropped tons of explosive blowing up rolling stock, and smashing rails and bridges. They attacked the German aerodromes, flying low to the level of the sheds, and spattering them with machine-gun bullets so that no German airmen came out of them that day. One man in flight, told in his own dry words, is like the wild nightmare of an airman's dream. He flew to a German aerodrome and circled round. A German machine-gun spat out bullets at him. Th

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airman saw it, swooped over it, and fired at the gunner. He saw his bullets hit the gun. The man ceased fire, screamed, and ran for cover. Then our airman flew off, chased trains, and fired into their windows. He flew over small bodies of troops on the march, stooped, fired and scattered them. Afterwards he met a convoy going towards Comines, and he circled over them, hardly higher than their heads, and fired into them. Near Warneton he came upon troops massing for a counter-attack, and made a new attack, inflicting casualties and making them run in all directions.

"Another man found himself under fire of the Archies mounted on lorries. He dived and fired on the gunners, who ran away and hid. One of our flying men attacked and silenced four machine-gun teams in a strong emplacement. Others cleared trenches of German soldiers, who scuttled like rabbits into the dug-outs. They fired everything they carried which would kill the enemy or destroy his material. Having used up all his Lewis-gun ammunition upon the marching troops, one lad fired his Véry lights, his signal rockets, at the next group of men he saw. The airmen flew at the field gunners and put them to flight; at the heavy guns crawling along the roads on caterpillar wheels; at transport wagons, motor lorries; and one motor-car, whose passengers, if they live, will never forget that sudden rush of wings four feet overhead, with a spasm of bullets about them. The aeroplane was so low that the pilot thought he would crash into the motor-car, but he just 'planed clear of it as the driver steered it sharply into a ditch, where it overturned with its five occupants. The airman went on his journey, scattered five hundred infantrymen, and returned home after a long flight, never higher than 500 feet from the ground.

"Meanwhile, during the progress of the battle, our air squadrons appointed for artillery observation work were all over the enemy's batteries signalling our gunners and sending them 'O.K.' flashes when our counter-battery work was effective. There were an amazing number of 'O.K.'s.' One air squadron alone helped a group of heavies to silence seventy-two batteries. Everywhere over the battle ground our air scouts were out and about, watching the progress of the infantry, speaking to them by signals, picking up their answers, flying

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back to headquarters with certain information, so that the direction of the battle was helped enormously by this quick intelligence. It was a day of triumph for the Royal Flying Corps and for all those boys with wings on their breasts who after their day's flight come down to French estaminets to the rattle of ragtime on untuned pianos, to give the glad eye to any pretty girl about, to fling themselves into the joy of life which they risk so lightly.

"One further story of the battle. A British airman fighting for the first time engaged in a big battle with a number of craft on both sides. At a crisis he tried a spinning dive, but fell some 8,000 feet before he could straighten himself. Just as he did so, when within some 2,000 feet of the ground, he saw two German planes in quick succession tumble past him. They had been shot down in the battle high above. But this was not the end of his experience of thunderbolts. As he began to mount again to try to join battle, a third German 'plane almost fell down on top of him. Did ever man before experience in such a manner what Tennyson in prophetic mood called 'the ghastly dew of airy navies'? But it is all in the day's work."

The Air Battle Continues

Throughout the next day and far into the night the fighting on the ground and in the air continued unabated. A desperate enemy counter-attack was repulsed by the British infantry with heavy losses, and innumerable raids were carried out by the aircraft against railway stations. In one case, a large accumulation of rolling stock containing a large freightage of bombs was exploded from the air, and the fires and explosions thus caused continued until the dawn. That day two of our gallant pilots lost their lives in a mid-air collision during a fight with a number of machines over the enemy lines.

If the development of the events of the great battle in the air over Messines Ridge were fully and truly told, the matter would revolve itself into an incessant catalogue of stirring deeds on the part of individual airmen, each one more wonderful than the other, every one an epic itself, each one eclipsing the wildest flights of the most vivid imagination. For instance,

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here are a few such chosen at random, outliving cold prosaic print. Well indeed did the R.F.C. deserve that unusual, and greatly appreciated, honour which was so graciously to be bestowed upon them once that bloody battle was ended, and left the British Infantry masters of their wide-flung objectives some six weeks later.

Personal Aspects of the Air Battle

To which branch of the fighting air services shall we first turn? The reconnaissance pilots, the bravest and least publicly acknowledged of all aviators? But evidently the British Commander-in-Chief realised them at their true merit. "He has rendered valuable service when on photographic reconnaissance," he reported of one such. "He has always shown the greatest skill and courage in leading attacks on hostile machines, and thus enabling valuable photographs to be secured behind the lines." Of Lieutenant Cleaver, M.C., R.F.C., who when flying at a low altitude on reconnaissance patrol was wounded in the arm, he reported that: "He continued flying for some time, gaining most valuable information. On landing he insisted on being taken to Headquarters to impart the results of his reconnaissance."

Lieutenant Heaven, R.F.C., "for conspicuous gallantry and devotion to duty when acting as an observer," was recommended for a Military Cross. Lieutenant Heaven's perhaps greatest achievement was when, his pilot having been wounded, he steered the machine back, and, landing in front of our lines, assisted his pilot into a shell hole, and eventually into the British trenches, under continuous rifle fire.

Bombing pilots, artillery direction pilots and observers, low-flying aviators—contact patrols as they officially were termed—kite-balloon aeronauts, and aviators bound on secret and special missions, it is ever the same story; that same conspicuous gallantry and unflinching devotion to duty. Of Lieutenant Beale, Sir Douglas Haig reported that: "He made two most gallant attempts to carry out a special mission, which involved a night flight of about fifty miles in very adverse weather. Although unsuccessful, he showed throughout the greatest courage and determination to achieve his mission."

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There was one low-flying aviator who descended to a height of 400 feet and attacked a large party of the enemy. Another reconnaissance airman, Lieutenant Davis, R.F.C., carried out a valuable reconnaissance of the enemy lines, flying for half an hour at a height of 500 feet. "Although attacked by five hostile machines, he succeeded in completing his task, effecting a safe landing. He was himself badly burnt, but rendered a valuable report." There was another contact-patrol pilot who carried out a patrol in heavy rain, with clouds, at 500 feet, during an attack. Another "carried out two successful contact patrols, flying for a considerable period very low and on our barrage, and rendering very complete reports on each occasion." Again, Lieutenant Norton, R.F.C., "reconnoitred the enemy's wire at a height of 300 feet, and brought back most valuable information"; and Lieutenant Stout, R.F.C., when on infantry patrol, flew twice for periods of two hours at a very low altitude, and on each occasion brought in a very complete and detailed report of the situation of the attack.

An artillery directing pilot "succeeded in reporting no less than thirteen active enemy batteries during one flight, observing fire on and silencing several of them."

Of two bombing aviators, one "succeeded in reaching his objective under extremely adverse weather conditions"; another "on one occasion (when returning from a raid over the enemy's lines), although the engine of his machine began to fail, continued to lead his formation and succeeded in bringing back most valuable information." Of still another, it was reported that: "He has shown great skill and gallantry in carrying out night raids on the enemy lines."

The gallant crews of the British kite-balloons equally supplied their glorious quota to this thrilling lexicon. Captain Sanson, although attacked three times by hostile aircraft, remained in the air in his balloon at its maximum height, and completed the task which he had in hand. Of Lieutenant Bolitho, it was reported that: "When his balloon was attacked by a hostile aeroplane he saw his observer safely out, and then descended by parachute himself." The case of Lieutenant George Simpson was even more striking: "While observing

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from a balloon which was set on fire, he went to the assistance of his fellow-observer, and would not leave the balloon himself until he had seen the other observer clear. He was severely burnt."

Even these glorious events pale to insignificance before the deeds of the battle airmen. In brief, here are a few choice examples of their work, and the deeds for which they most rightly were rewarded. "On one occasion he led his formation against an enemy patrol, and himself drove down two hostile machines." "He has brought down three hostile machines, and in addition forced many others down to the earth." "He came down to a low altitude and destroyed a hostile scout, which was attacking one of our machines."

A Fight to the Finish

Flight-Lieutenant Lloyd Breadner, R.N.A.S., when leading his patrol against hostile formations, himself brought down three German aeroplanes, and forced several others to land. On another occasion he drove down a hostile machine, which was wrecked when trying to land in a ploughed field. Four days later he destroyed a hostile machine which fell in flames, brought down another in a spinning nose-dive with one wing folded up, and forced a third to land. Flight Sub-Lieutenant John Malone, R.N.A.S., successfully attacked and brought down numerous hostile machines about the same period. While on patrol early one morning he attacked a hostile scout, and drove it down under control. He then attacked a second scout, which, after the pilot had been hit, turned over on its back and went down through the clouds. A third scout, attacked by Flight-Lieutenant Malone from a distance of about twenty yards, descended completely out of control. While engaging a fourth machine he ran out of ammunition, so returned to an advanced landing ground, replenished his supply, and at once returned and attacked another hostile formation, one of which he forced down out of control. The following day he engaged a German two-seater machine, and, after badly wounding the observer, forced it to land on our side of the lines.

"One story of a date just before the battle I must tell," reports Mr. Beach Thomas, in an account of the later stages of

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the battle of Messines Ridge. "A young airman, while duelling, received a bullet in his machinery, and knew that he could only fly for a short while longer at reduced speed. His old opponent had vanished, but a new one appeared above him and behind him.

"They were flying just in front of the Ypres salient, and he could make sure of sliding down to our lines, but he knew that if he adopted these tactics the German would pump lead into him all down the slope. The thought was intolerable, so he turned the machine round, and with his last petrol and the last kick of his engine drove straight at the enemy head on. Both fired. The German's nerve appeared to give first, and he dipped underneath; then the Englishman turned and dived homewards. He still expected pursuit, but heard nothing and did not look round till he was near the ground, when, to his amazement, he saw the enemy's plane in flames behind him. The two landed in our lines, not half a mile apart, and our young airman jumped from his machine and ran to see the wreck of the enemy's. He found the body of the German pierced by five bullets. He must have been already dead when his plane dipped underneath and avoided collision."

Honours of the Royal Flying Corps

By the end of June the honours already awarded to the gallant aviators of the R.F.C. included no fewer than seven V.C.'s, 72 D.S.O.'s, 304 Military Crosses, 97 Military Medals, 54 D.C.M.'s, 53 Meritorious Service Medals, and 486 "mentioned in dispatches." In addition, there had been several awards of decorations from the Governments of other Allied nations. This total, too, did not include the honours awarded to the officers and men of the R.N.A.S., which would swell this fine total pretty considerably. Early in April it was announced that His Majesty the King had assumed the title of Colonel-in-Chief of the Royal Flying Corps, which, for this purpose, included the Royal Naval Air Service.

Meanwhile the battle in the air was progressing apace. The British infantry success beyond Messines on June 11 was followed by a period of most valuable co-operation on the part of the aviators of the R.F.C., who made possible a further

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British success beyond Messines the following day, June 12. Aircraft, again, preceded the infantry attack on Messines on the 14th, their efforts being largely responsible for considerable territory being captured, and the Infantry Hill near Monchy being stormed.

Further Progress in the Air Battle

The infantry progress near Bullecourt on the 15th, again, was followed by particularly successful work on the part of the aircraft. The British pilots co-operated both with the artillery and in valuable reconnaissance and bombing raids. Many fights that day took place in mid-air, in which innumerable machines of both sides were engaged.

During a period from the 17th to the 22nd the weather was unfavourable for flying. But despite this fact, on June 21 good results were obtained by aircraft in the direction of the British artillery fire. This co-operation proved invaluable in regaining the ground which the enemy had succeeded in recapturing on the 20th, and also in commencing the new offensive in the neighbourhood of the Belgian coast. Four days later, the British infantry made further progress in the direction of Lens.

The German attack against Fontaine on the 27th was easily repulsed, and the following day we gained another success near Lens, Avion being entered and valuable enemy positions captured. Meanwhile, however, owing to renewed bad weather, the air war for a period became detached from the infantry attack. Again, while the latter was for the most part of a tactical nature, the air manœuvres of the period were inevitably strategical, the aircraft operating miles beyond the range of plans of any of the infantry commanders. But on the 29th of the month a few preliminary skirmishes paved the way to the most strenuous and desperate period of aerial fighting and bombing activities which yet had occurred in the war. On the 29th several desperate encounters took place between the British aviators and enemy formations of unusual numbers—a fact which could only be taken as indicative of the return of the famous von Richthofen to the enemy fighting air front—which was duly announced in the enemy *communiqué* of

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the 25th, after he had been absent for a period of over two months.

Return of Von Richthofen

Von Richthofen's return, in fact, may truly be said to have led in a large measure to the intensity of the renewed air fighting, it was at the same time a period of intense bombing activity. There was a considerable recrudescence of air fighting on July 6, chiefly on the front between Lens and Ypres. In this area German machines again were encountered in large numbers, formations composed of as many as thirty being encountered. Despite this activity on the enemy's part, however, we succeeded in bombing his aerodromes during the day, causing damage, and carried out successfully a great deal of artillery work and photography. This activity, in its turn, was followed by considerable bombing during the following night, while the enemy also in this respect showed more initiative than previously. He dropped 144 bombs on our side of the lines, our bombing machines meanwhile dropping nearly three times that number on his side. In the fighting during the day eight hostile machines had been brought down, and six others were driven down out of control, to a total loss of five British machines.

The following day, July 7, proved an equally strenuous one in the aerial campaign, and again the enemy displayed the greatest activity in the air. Fighting was continuous throughout the day. Hostile aircraft worked in large formations, which were frequently broken up by the British pilots. Our airmen also carried out a number of successful raids, in the course of which the enemy's aerodromes, depots and troops were attacked with bombs and machine-gun fire, and considerable damage was caused.

The great British aerial offensive, referred to by Sir Douglas Haig in his final summing-up of the operations and results of the battle, was begun. During the past six months the part played by the Royal Flying Corps in the general battle had grown more and more important. Each successive attack had served to demonstrate with increasing clearness the paramount necessity for the closest co-operation between air and land arms.

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All had to work together on a general plan towards one end—the defeat of the enemy's forces.

In accordance with this governing consideration, co-operation with artillery, photography and reconnaissance had been greatly developed and actively continued. Air fighting had taken place on an ever-increasing scale in order to enable the machines engaged upon these tasks to carry out their work. In addition, the persistent raiding by enemy aeroplanes and airships of British cities and towns, and the enemy's open disregard of the losses thereby caused to civilian life and property, had recently decided the British Government to adopt counter measures. In consequence of this decision a series of bombing raids into Germany was begun, and continued whenever weather conditions proved sufficiently favourable. In conjunction with this, long-distance raiding had taken a prominent place and become a recognised part of the general scheme of attack.

During the next two days, July 8 and 10, while the weather conditions rendered surface operations impossible, the air war continued in full swing. Storms, low clouds and thick mists, which a few months previous would have made flying impossible, were weathered every day without casualty. In addition to numerous bombing raids on the German lines of communication, much reconnaissance was accomplished, also a great deal of valuable photography.

Meanwhile, as the Canadian infantry lay eagerly waiting before Avion, and as day after day, for some unknown reason, the great infantry attack was maddeningly postponed, the air was dark with the dark specks of the British aeroplanes flying out to battle or on their innumerable patrols. German high-explosive, little glinting, sinister bursts of flame vividly traced their flights across the heavens, but our airmen flew on, undaunted. Suddenly the lithe form of a watchful British machine would come darting down from the sky, in the region of the lines; a squat ungainly German "sausage"—kite-balloon—frowning across the sullen lines of trenches took fright with almost equal rapidity, and hastily descended to the earth. Some enemy aviator, more daring than the rest, would venture his nose over our way, attempt a few rapid bursts with his

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machine-gun at nothing in particular, and in what he considered to be a spirit of reckless daring, then turn and fly post-haste for some safe corner behind the clouds. The moral happily was obvious to all; at last we had gained unmistakable supremacy of the air. The tired, bored infantry, wallowing deep in their muddy, smelling trenches, would lean upon their guns and watch these daring evolutions but a few feet up over their heads with envious glistening eyes.

Towards sunset—it was July 10—the British squadrons sped home to roost. But one young airman remained hanging over the lines. Immediately the enemy pilots, now knowing that our flights had retired, dared to show themselves, proceeding cautiously towards the lines. It was the signal for the lone British aviator. Out he would dart. Short, sharp and fierce would be the encounter. Either the enemy plane had dived for earth a whirling spiral of smoke and flame, or his tail could be seen rapidly disappearing across the sky-line. It was a great hour for our man. Filled with youthful exuberance, back he would fly to our side of the trenches again, dropping like a tumbler pigeon, rolling over and over down the spiral staircase of the sky, or falling in a frightful nose-dive, which was like certain death until he flattened out and flew, just to shave his wheels over the shell craters. Even he returned without accident to his aerodrome, there to be suitably reprimanded for his youthful daring and unnecessary exhibition.

Seven Days' Work in the Air

The seven days which followed—July 11-17—was marked by fierce and almost continuous air fighting. "Yesterday," to quote the British official *communiqué* of the 13th, "there was unceasing aerial activity on both sides from dawn till late at night. The fighting, which resulted greatly in our favour, was the most severe that has been experienced since the commencement of the war." During those seven days no fewer than 42 German machines were brought down by our pilots, three shot down by our anti-aircraft guns, and 43 driven down out of control. The number of British machines missing in the same period was 31!

This disproportion may be taken as fairly illustrating the

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average measure of our aerial supremacy at this time over the Germans. In other words, we usually succeeded in giving very much more than we got. The weather on the whole was not good for aircraft work. Despite this fact, however, the battle in the air raged unabated, the most notable feature of this fighting being the size of the enemy formations; more than once British airmen reported encountering hostile groups numbering between thirty and forty machines. This showed clearly that the enemy trusted to make up by overwhelming superiority of numbers what he lacked in individual qualities. When attacked, however, these large formations invariably lost their tactical cohesion, and the fight resolved itself into a series of disconnected contests.

The Adventures of a British Observer

Many gallant exploits were recorded during this period, but they were all so much like the countless brilliant deeds which had gone before that they were taken quite as a matter of course, and as all in the day's work, by their authors and their comrades. Here, for example, is the day's work of one flying unit: Total time in the air of all machines, 308 hours 40 minutes; number of bombs dropped on German back-areas, 101 of 20 lbs. each, three of 112 lbs., and seven of 230 lbs. In addition, photographic work, reconnaissance work and artillery spotting were carried out, as part of the normal routine. Two officers who remained up for four hours ranging for the artillery were enabled to record an unusual number of successes.

An observer in a fighting reconnaissance machine had a thrilling experience on one of these days. His plane was attacked by five Albatros scouts. The British machine drove down one of its assailants, which crashed, and sent a second nose-spinning out of control. Then the pilot lurched forward in his seat as a bullet from a machine-gun found its billet, and the observer began to take charge. Emptying the drum of the Lewis gun at his enemies, the observer leaned across the stricken figure of his comrade, and although he had very little knowledge of pilot's work succeeded in landing behind the British lines.

"More and more, week by week," Mr. Beach Thomas wrote to the *Daily Mail* on the 20th, "we see these counter-battery

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duels waged to the death; and if anyone has any doubts about our air service in France he should see the daily list of batteries marked down and ranged upon by our observers. The war is becoming more and more a counter-battery war, and this means that the Air Service takes a bigger and bigger part.

"The enemy is hiding his guns more and building heavier defences for them; he surrounds them with smoke screens and roofs them with concrete and walls them with scene-painting and divides them with sham batteries; but he has not yet dodged the eyes of our airmen with any general success. We have knocked out many guns, if not whole batteries, in the recent and still continuing duels, especially round Lens, a town important in itself and a valuable fortress on the road to Lille.

"The enemy has been forcibly driven by the development of the war to drive his airmen over our lines and multiply his balloons. Ten of his observing balloons were up at one time in the Lens area alone."

Facts and Figures of the Air Battle

The details of the events of the air war during this remarkable period speak eloquently for themselves. A large number of bombs were dropped by British aircraft on the night of July 11, that is the early morning. Throughout the day eight other successful raids were carried out. In the course of air fighting four German machines were brought down, and six other hostile machines were driven down out of control. Three British machines were reported missing.

The record day referred to by General Haig—the 12th—was a day of great aerial activity on all hands. During the previous night bombing operations against the enemy's railway stations, hutments and aerodromes were again carried out with activity on both sides from dawn till late at night. Continuous engagements took place between large formations, consisting in some cases of as many as thirty machines. As a result of these encounters fourteen German aeroplanes were brought down, three of which fell within our lines, and sixteen other hostile machines were driven down out of control. In addition, one enemy machine was shot down by a direct hit from the British anti-aircraft guns. While our scout machines were

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engaged in fighting, other British aeroplanes took many photographs, and the bombing of the German dumps and railway stations was continued, large numbers of bombs being dropped with good results.

The following two days, the 13th and the 14th, aerial activity dwindled considerably. The only aviation event of any importance on the former day was the bombing operations of the British planes, which were continued with success that day and throughout the previous night. On the night of the 13th-14th four important railway stations behind the enemy's lines and a large German rest camp were bombed by our airmen. In spite of heavy thunderstorms throughout the day, bombs were dropped on a hostile aerodrome and an enemy ammunition dump, and much valuable work was done in co-operation with our artillery. In air fighting three German machines were brought down, and two others were driven down out of control.

Six Months' Summary of Air Fighting

To sum up. Throughout the progress of the battle itself low-flying aeroplanes not only maintained contact with the advancing British infantry, reporting their position and signalling the earliest indications of hostile counter-attack, but themselves joined directly in the attack by engaging the enemy's infantry in line and in support with machine-gun fire and bombs, by assisting our artillery to disperse hostile concentrations, and by spreading confusion among the enemy's transport, reinforcements and batteries.

In answer to these concentrations of hostile machines on the British front and the strenuous efforts made by the enemy to reassert himself in the air, the bombing of German aerodromes was intensified, and was carried out at great distances behind the enemy's lines. In more than one instance the enemy was compelled to abandon particular aerodromes altogether as the result of the incessant British raids.

King George and Queen Mary Visit the R.F.C.

About the middle of July the Royal Flying Corps was paid an unexpected and thoroughly appreciated visit by King George and Queen Mary. Mr. Philip Gibbs describes this historic

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visit in the following manner in various days' issues of the *Daily Telegraph* of this period :

"Not once, but several times, I saw the King in fields above which there were brisk engagements in the air, the rattle of machine-gun fire between German and British pilots, and the short knocking of ' Archie ' shells flinging snowballs along the track of hostile planes. All this was the real thing, not staged for a Royal show, and with a spice of peril in it. . . . The war was not far away. In the afternoon the King motored near to it, skirting the old town of Furnes, into which the enemy shoots now and then with his long-range guns, and going to Coxyde, in a desolate waste of sands, from which we could hear very clearly the noise of bombardment and the thunder of the German guns. The way back brought us to Dunkirk, which the enemy has been trying to reach with heavy shell. That afternoon the King visited two aerodromes. The flying officers were presented to him, and then some of them ran to their machines and slipped quickly into their flying kit, and at the word ' contact ' soared aloft at a terrific pace, climbing up the high ladders of the sky like acrobats of incredible agility, falling, banking, cork-screwing and nose-diving in an aerial circus. Some of these young men had just attacked and destroyed two of the German raiders back from Harwich.

"A similar exhibition of skill was given at an aerodrome of the R.N.A.S., where the King was afterwards entertained to tea. Glorious children, these flying fellows, tuned up to the highest pitch of youthful spirit, taking frightful risks light-heartedly, and making merry of the beastly game of war as long as their nerves stand the strain of service."

CHAPTER XIII

AIR RAIDS AND THE AIR RAIDER

Daylight Raid of July 7—The Attack on London—German Aircraft Raids on London to date—Air Raids, Cause and Effect—Enemy Aerial Strategic Policy—German Raids on Paris—Air Raids on Britain—Attempts by Zeppelins—The "Silent Raid"—The Home Front—First Air Ministry—Ministry and Home Defence—Royal Aircraft Factory—Aerial Home Defence—Raids on England in 1917 and 1918.

JULY 7, 1917, will remain for ever a day of humiliation in the history of British aviation. The enemy does and rightly can claim the honours of that beautiful clear summer's morning. For over fifteen minutes a German squadron of twenty-two machines, led by that famous enemy aviator, Lieutenant Kleine, flew in full view over the heart of London. It was at once the most daringly audacious evolution of the war. The enemy squadron moved as though it were a single machine, never out of time or place, "banking" together as though by clockwork, its manœuvres and formation being almost perfect.

With great calm and deliberation a series of bombs was dropped on London from positions as far north as Watford and Harrow to the Kentish towns on the borders. No fewer than 59 people were killed and 193 injured, and the damage to property could be estimated at thousands of pounds. The whole world rang with the news of this exploit, and the Germans were justly jubilant.

For this dismal defeat no blame attaches to the rank and file of the British Air Service. Although equipped with out-of-date machines, they yet succeeded in attacking the massed formation of the enemy, paying for their temerity with their lives. Every available machine was required in France and

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output was still far below the demands of the Service in the Field, which were of paramount importance; so that to some extent the home defence schemes, which by this time were fully and effectively organised, suffered in point of the material at their disposal; they had to content themselves with older types of planes. As ever the pilots and observers proved themselves to be ready and willing.

The Story of the Raid

At about 9.30 A.M. on the morning of July 7, 1917, two squadrons of German machines, numbering twenty-two in all, appeared over the Isle of Thanet and the coast of Essex. Here they were attacked without success, but in the most gallant fashion by the defence squadron stationed near Southend. This attack was marked by a particularly plucky deed of one British aviator.

The Major in charge of his squadron, better than any possible narration, tells the simple yet glorious story of his death in a letter to the dead man's father. "Dear Mr. Young," he wrote. "It is with the deepest regret and sympathy that I have to write and inform you of your son's death, which took place on Saturday during the enemy aircraft attack on this country.

"Your son, as you know, had only been in my squadron for a short time, but quite long enough for me to realise what a very efficient and gallant officer he was, and what a tremendous loss he is to me. He had absolutely the heart of a lion, and was a very good pilot.

"Your son has been up on every raid of late, and has always managed to get in contact with enemy machines. The last raid, which unfortunately resulted in his death, shows what a very gallant officer we have lost.

"Almost single-handed he flew straight into the middle of twenty-two machines, and both himself and his observer at once opened fire. All the enemy machines opened fire also, so he was horribly outnumbered. The volume of fire to which he was subjected was too awful for words.

"To give you a rough idea. There were twenty-two machines, each machine had four guns; each gun was firing

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about 400 rounds per minute. Your son never hesitated in the slightest. He flew straight on until, as I should imagine, he must have been riddled with bullets. The machine then put its nose right up into the air and fell over, and went spinning down into the sea from 14,000 feet. I, unfortunately, had to witness the whole ghastly affair.

"The machine sank so quickly that it was, I regret, impossible to save your son's body; he was so badly entangled in the wire, etc. H.M.S. — rushed to the spot as soon as possible, but only arrived in time to pick up your son's observer, who, I regret to state, is also dead. He was wounded six times, and had a double fracture in the skull.

"I cannot speak too highly of the magnificent behaviour of your son; all that I can say is that he was a most gallant officer, and that I am proud to think that he was in my command.

"I hope that you and your family will accept my sincerest sympathy, and also the sympathy of all his brother officers, in your great loss."

The Attack on London

After dropping some bombs on the Thanet towns, the German raiding machines proceeded in the direction of London, moving roughly parallel to the north bank of the Thames. They approached London from the north-east, then, changing their course, proceeded north and west, and crossed London from north-west to south-east. During the whole time the enemy air squadron was over London no British machine was seen to attack them; nor, for that matter, was one observed in the sky at all, until the raiders were returning and were over Woolwich, when they were gallantly attacked by a few small machines.

Meanwhile, on information being received that enemy aircraft were attacking England five flights were sent up from Dunkirk to intercept them as they returned. The German raiding squadron was not sighted, but three enemy seaplanes were encountered and destroyed, and one enemy aeroplane was driven down into the sea and another enemy machine driven down. The British machines returned to replenish their petrol

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and left again immediately. In the course of this patrol one German aeroplane was brought down in flames, and another forced to land on the beach damaged near Ostend. During the course of these operations, however, none of the enemy machines which had raided England was encountered, and it was thought highly probable that they had returned near the Scheldt and over Dutch territory.

According to the German version: "On the morning of July 7 one of our aviation squadrons attacked London. At about 11 o'clock in the morning bombs were freely dropped on the docks, harbour works and warehouses on the Thames. Fires and explosions were observed. One of the English aeroplanes which went up in defence was shot down over London. Also at Margate, on the east coast of England, bombs were dropped. Our aeroplanes all returned excepting one, which was compelled to make a descent in the sea, and could not be saved by our naval forces."

Later this was amplified by a semi-official telegram issued in Berlin which said that "a squadron of big flying aeroplanes, commanded by Lieutenant Kleine, attacked London at eleven o'clock on Saturday morning during a bright day. The attack was in the first place directed against storehouses and factories. Bombs were dropped on the docks and the northern bank of the Thames, between Charing Cross Station and east of the Tower Bridge. This attack lasted a quarter of an hour. Results were observed by smoke clouds and explosions. Charing Cross Station was hit several times. A second attack was directed against Margate Harbour. Here also results were obtained. British anti-aircraft guns harassed our aeroplanes during the whole raid, and were very violent at London. Enemy airmen attacked our squadron, but without result, and were dispersed. One of our aeroplanes was forced by a defect in the motor to descend into the sea. It could not be saved."

German Aircraft Raids on England to Date

The July 7 raid on London was the sixty-sixth made by German aircraft on this country since the war. The more important of these raids having been as follows:

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1914		Objective	Killed	Injured
Dec.	24	.. Dover (A.)	—	—
„	25	.. Dover and mouth of Thames (A.) ..	—	—
1915				
Jan.	19	.. Yarmouth, Sheringham, and King's Lynn (Z.)	4	16
Feb.	21	.. Colchester, Coggeshall, and Brain- tree (Z.)	—	—
April	14	.. Tyneside (Z.)	—	2
„	15	.. Lowestoft and East Coast (Z.) ..	—	—
„	16	.. Faversham (A.)	—	—
„	29	.. Ipswich and Bury St. Edmunds (Z.)	—	—
May	10	.. Southend (Z.)	1	2
„	16	.. Ramsgate (Z.)	2	1
„	27	.. Southend (Z.)	3	3
„	31	.. Outer London (Z.)	7	35
June	4	.. East and South-east Coast (Z.) ..	—	8
„	6	.. East Coast (Z.)	24	40
„	15	.. North-east Coast (Z.)	18	72
July	3	.. Harwich (A.)	—	—
Aug.	9	.. East Coast (Z.)	17	21
„	12	.. East Coast (Z.)	6	24
„	17	.. Eastern Counties (Z.)	10	48
Sept.	7	.. Eastern Counties (Z.)	18	38
„	8	.. Eastern Counties and London (Z.) ..	26	94
„	11	.. East Coast (Z.)	—	—
„	12	.. East Coast (Z.)	—	—
„	13	.. Kentish Coast (A.)	2	6
Oct.	13	.. London and Eastern Counties (Z.) ..	56	114
		(Soldiers)	15	13
1916				
Jan.	23	.. East Coast and Kent (A.)	1	6
„	24	.. Dover (A.)	—	—
„	31	.. Norfolk, Suffolk, Lincolnshire, Leices- tershire, Staffordshire, and Derby- shire (Z.)	67	117
Feb.	9	.. Kent Coast (A.)	—	3
„	20	.. Lowestoft and Walmer (A.)	1	1
Mar.	1	.. South Coast (A.)	1	—
„	6	.. Eight English Counties (Z.)	18	52
„	19	.. East Kent, Dover, and Ramsgate (A.)	14	26
„	31	.. East and North-east Coasts (Z.) ..	98	94

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1916		Objective			Killed	Injured
April	1	..	North-east Coast (Z.)		22	130
"	2	..	Scotland, N. and N.E. Counties (Z.)		13	14
"	5	..	North-east Coast (Z.)	.. ..	1	9
"	24	..	East Counties (Z.)	.. ..	1	1
"	25	..	Essex and Kent (Z.)	.. ..	—	1
May	1	..	East Coast and Scottish Border (Z.)	.. ..	—	—
"	2	..	English Coast (Z.)	.. ..	9	30
"	3	..	Kent Coast (A.)	.. ..	—	1
"	19	..	Kent Coast (A.)	.. ..	1	2
July	29	..	Norfolk and Lincolnshire (Z.)	.. ..	—	—
"	30	..	East and South-east Counties (Z.)	.. ..	—	—
Aug.	9	..	Scotland (Z.)	.. ..	6	16
"	23	..	Eastern Counties (Z.)	.. ..	—	—
"	24	..	Outskirts of London (Z.)	.. ..	8	21
Sept.	3	..	Eastern Counties (Z.)	.. ..	4	12
"	23	..	London and Midlands (Z.)	.. ..	40	130
"	25	..	East Coast and Midlands (Z.)	.. ..	43	31
Oct.	1	..	East Counties and North London (Z.)	.. ..	1	1
"	23	..	Margate, Sheerness (Z.)	.. ..	—	2
Nov.	27	..	Yorkshire, Durham, and Norfolk (Z.)	.. ..	4	37
"	28	..	London (A.)	.. ..	—	10

Air Raids—Cause and Effect

Considering the large and important part played by raiding aircraft in the war—as shown clearly by the above list—one begins to wonder exactly how the term arose—how, when and where the first actual raid took place.

For the term itself, it may be said that air-raid means really a predatory incursion by air, carried out either by one or several squadrons of aircraft dropping bombs on an enemy military position or town. Strictly speaking, the air-raid, as a manœuvre of war, was of German origin. Aircraft prior to the war were considered by the French and British military authorities more in the light of a non-combatant unit of the fighting forces, as the eye of the armies in the field, which would ultimately supersede the cavalry in all functions of preliminary reconnaissance. Though the British—as may be judged from a statement made by Colonel (now Major-General) Seely in the House of Commons in 1913 that a wonderful anti-aircraft gun had been tested which would prove deadly against aerial visitors—had con-

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sidered the possibility of aircraft being employed in an offensive capacity, it remained for the enemy to first put this principle into practice. A Zeppelin raided Luneville, a French frontier town, eight days after the outbreak of hostilities.

The Germans were very considerably impressed with the success of this venture. In the early days of the war a secret meeting, attended by General von Kluck, Admiral von Tirpitz, the Imperial Chancellor and the Kaiser in person, decided that an extensive series of air-raids should be carried out in all theatres of war, and orders accordingly were given to every German armament establishment to speed up the output of aircraft and aircraft bombs by fifty per cent.; two months later by a hundred per cent.

Enemy Aerial Strategic Policy

As part and parcel of the original German strategic policy, which was to break through to Paris and bring the war to a successful conclusion within a few months, the number of available enemy aircraft soon outnumbered the combined British and French air forces, and while there were but isolated and brilliant raids on the part of the Allied aviators, the Germans were soon carrying the war in the air into the heart of the Allied countries. Had the prowess of their personnel but proved the equal of their brilliant development of craft, little doubt can remain but that their air squadrons—as was later the case with the Independent Force, R.A.F.—would have played a large part in an ultimate (German) success. The enemy initiated the air-raid, and through force of a mistaken policy survived to reap the full benefit of its disastrous success, the Allied air services afterwards taking almost a monopoly of this invaluable weapon of modern warfare.

In the Eastern theatre of war, against the poorly equipped Russian forces aerial success was cheaply bought; but the long record of raids over Britain and France was one, from the German point of view, of comparative failure. When, some time after the signing of the Armistice, President Poincaré publicly conferred the Legion of Honour on the town of Dunkirk as some slight recognition of the heroic effort of its inhabitants in five long and, for the Dunkirk people, disastrous

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years of war, three interesting facts were disclosed. The town had been shelled from the sea on no less than four occasions. Shells from the huge German siege-gun, concealed in the sand-dunes over twenty miles away, had burst in the streets of Dunkirk on thirty-four occasions, while German airmen bombed the town, harbour, shipping and outlying aerodromes 172 times. To the eternal credit of this great French port let it be said that this intensive enemy attack by land, sea and air—particularly by reason of those incessant and murderous enemy air-raids had Dunkirk gained the unenviable reputation of "The City of Dreadful Night"—in no way affected the *moral* or diminished the strategic use of the town as a base, either for Allied naval or Allied aircraft operations against the enemy positions on the Belgian coast. Once again the German terrorist campaign failed in its main objective.

German Raids on Paris

Official statistics relating to the aerial bombardments of Paris reveal the fact that this *guerre à mort* failed in any way to intimidate the moral of the gallant inhabitants of the French capital. That it was of an unusually active nature may be judged by the following facts and figures: "Big Bertha," the enemy artillery monster of the war, dropped an aggregate of 168 large shells on Paris, mostly on the outskirts, killing 196 and injuring 417 people. In 1914 45 bombs were dropped by German airmen on Paris, 17 in the course of one raid, that of October 1; in 1915 70, of which 62 were dropped on March 20; in 1916, 61; in 1917, 14; in 1918, on January 30 89 bombs were dropped, causing death to 36 persons and injuries to 192; during the last six months of the war, 396. These bombs were responsible in all for 1,211 victims, including 402 killed and 809 injured.

A further 206 were killed and 392 people injured by 228 bombs dropped by Zeppelins on La Ville Lumière. One such bomb, measuring 9 feet long and weighing 660 lbs., which failed to explode, is still preserved in the municipal laboratory. This projectile contained no less than 200 small incendiary grenades, and apparently was the first of its kind to be made use of. After the close of hostilities it was learned that the

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Germans were constructing this class of bomb in enormous quantities. Each of these projectiles was capable of causing a fire against which water was useless; only sand would have proved effective in extinguishing the flames. But for the Armistice the German intention had been to raid Paris profusely with these bombs throughout the winter of 1918-19. Altogether, it may be said that the enemy campaign against Paris did not prove an unqualified success. The Parisians smiled gaily at their vain efforts until the end.

Air Raids on Britain

Fifty-one German airship and fifty-seven aeroplane raids on Britain were responsible for the comparatively low aggregate of 1,117 civilians killed and 2,886 injured, a total of 4,820 casualties; and of damage to property estimated at £6,777,730. In addition 58 soldiers and sailors were killed and 121 injured by Zeppelins, and 238 killed and 400 injured by aeroplanes. These totals were made up as follows:

FIFTY-ONE AIRSHIP RAIDS

		MEN	WOMEN	CHILDREN	SOLDIERS AND SAILORS	TOTAL
Killed ...	...	217	171	110	58	556
Injured ...	...	587	431	218	121	1,357
						1,913

FIFTY-SEVEN AEROPLANE RAIDS

Killed ...	...	282	195	142	238	857
Injured ...	...	741	585	324	400	2,050
						2,907

Totals killed and injured

1,827	1,382	794	817	4,820
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In 51 British municipal districts which suffered by enemy air raids, according to Mr. G. L. Wardle, M.P., the then Parliamentary Secretary to the Board of Trade, at least 488 civilians were killed, 1,014 injured, and the estimated cost of making good the damage to property was £177,773!

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Attempts by Zeppelins

Zeppelins first raided this country on January 19, 1915, and continued a series of spasmodic visits until April 13, 1918. On twelve of these occasions they failed to claim a single victim. The heaviest enemy airship casualty list, which totalled 199, was caused in the raid over Norfolk, Suffolk, the Home Counties and London, on the night of October 13, 1915, when 84 civilians were killed and 107 injured, and 17 soldiers and sailors were killed and 21 injured.

In the Zeppelin raid on Lincolnshire, Essex and Suffolk on the night of March 31, 1916, 31 sailors and soldiers were killed and 55 injured.

On October 1 of the same year, an extensive raid over Lincolnshire, Norfolk, Cambridgeshire, Northamptonshire, Hertfordshire and London resulted in one woman being killed and one injured.

The series of German aeroplane raids on Great Britain commenced on December 24, 1914, at Dover, when there were no casualties, and the last raid occurred on June 17, 1918, over Kent, with a like result.

The first five aeroplane raids over this country claimed no victims and 13 others took place without a single casualty being caused.

The most disastrous result of the visits of the German Gotha raiding squadrons was on June 13, 1917, when 162 persons were killed and 432 injured, while the most memorable of these raids occurred in daylight, a daring Gotha squadron sweeping to and fro over London in splendid formation on the morning of Saturday, July 7, 1917, as has already been told.

On September 3-4 of the same year 131 sailors and soldiers were killed and 90 injured in a raid on Kent. In the previous raid on May 25, 18 men of the forces were killed and 98 injured by bombs dropped on Kent and Folkestone.

Of this infamous and dastardly campaign of the Germans, which earned for them the nickname "the Baby-killers," a term which will stick to them for all time, many of their raids were, despite our unpreparedness, quite abortive and devoid of results—or results which made the greatness of their effort laughable; it was recorded of one such raid that the only casualty inflicted

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after a large number of bombs had been dropped, happily on open country, was one rooster. The tabulated record here given, however, is a damning commentary on the cowardly and lying pretext of the German High Command that they raided and bombarded only "fortified places." Careful analysis of the casualties shows that their infamy accomplished the deaths of so large a proportion of civilians, and those again largely women and children, in relation to naval and military service men, as to completely dispose of the hypocritical German assertion.

It took the military authorities in this country some little time to cope satisfactorily with this new menace, but once a definite defensive scheme was evolved it proved invincible, and the enemy air raids grew gradually less and less frequent and at the same time more disastrous to the German aviators. In 1915, however, Britain appeared to lie entirely at the mercy of these Hun air marauders. Typical of our unfortunate situation—the most ignominious in British history since the invasion of the Dutch Fleet—was Mr. Balfour's, the then First Lord of the Admiralty, disquieting statement to the alarmed Commons, made on September 15 of that year. It was "inevitable" owing to want of knowledge and experience, remarked Mr. Balfour, that the organisation provided against aircraft should have proved "quite inadequate." He added that the problem of defending London from air raids was not identical with that of defending Paris, which he described truly enough as a "military fortress," and therefore "supplied with a great mass of guns and with great defensive arrangements."

The public mind was somewhat appeased with the appointment of Admiral Sir Percy Scott, the great gunnery expert, coincident with the Balfour speech, to the command of the artillery defences of London against aircraft. Later, when these arduous duties were taken over from his capable hands by Major-General Ashmore, C.M.G., all manner of ingenious methods were devised under his supervision, until the London aerial defences soon became practically impenetrable to enemy air raiders. During the time these defences were in progress there were two more day raids made with a view to reaching

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London. One was stopped at Southend and the other at Ramsgate, and at the latter place the guns shot down two of the raiders.

So far as the night raids were concerned the British Government spared nothing in the way of guns and searchlights. On one occasion only was an invading night air fleet allowed to pass overhead without a counter-attack by anti-aircraft guns and aeroplanes. Certainly an unique occasion even in the annals of air-raiding: on the night of the "Silent Raid," October 19-20, 1917, not a gun was fired, not a British plane sent up and not a searchlight switched on. A dense fog over which the raiding Zeppelins flew served to conceal them from sight and at the same time prevented observers on the ground from hearing their engines with any degree of accuracy.

Owing to the vigilance of the British Navy in the North Sea, by this time it was impossible for the Germans to obtain any idea of the prevailing weather conditions outside of Germany. The 12 Zeppelins engaged in the raid set out on a fine, still evening, but ran into a gale immediately they had crossed the English coast-line, between Withernsea and Clacton, at about half-past eight. The condition of the weather over the British Isles was most curious. Where an entire calm prevailed in the lower altitudes and on the ground, at the height which the enemy fleet was flying the clouds were black and overcast, and a fierce gale was raging. Bowled along through the air before the wind the Zeppelin commanders lost completely all idea of their bearings; though one succeeded in dropping bombs in the neighbourhood of Derby and between Wolverhampton and Birmingham, and another played havoc with Piccadilly Circus, of the 12 ships which originally set out from Germany but four returned to their proper stations. Of the other seven, one was hit by shell-fire and destroyed while attempting to cross the Allied lines near Nancy; one surrendered near the Swiss frontier, another some 50 miles north of Toulon, while a fourth drifted out over the Mediterranean, where it sank "without trace."

The "Silent Raid" brought to a climax the year of greatest activity in the air on the Home Front of the war. Auspiciously

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enough, 1917 had opened with the formation of the first Air Board. The impossible had been achieved. For months and years, from the earliest days of the war, the scheme had been glibly talked of—abandoned—reconsidered; and, at every heavy British reverse on the Home Front—and there were many such during the first two years of the war—flourished in front of the eyes of the hysterical civilian population, as a last drastic, complicated, expensive, but none the less potent resource against the continued success of German wings. In January, the Air Board at last had celebrated its official birth; but it did not develop into the fuller Air Ministry until the beginning of 1918.

The Air Board and Home Defence

The immediate results of the activities of the new Board were three-fold. Its purpose was mainly the supply of aircraft, but its influence affected a sense of general reorganisation throughout the whole of the air service. All orders for the supply of aircraft to the two branches of our aerial fighting forces were transferred from the Admiralty and the War Office to the Board, automatically. While, however, primarily its function was to co-ordinate this production; to place the necessary orders for construction and to see that the machines were delivered in the shortest possible time, consistent with efficiency, the Board served to affect a responsible organisation in other vital branches of the air services over which it had no shadow of control, while construction of aircraft was speeded up by at least seventy per cent.

Royal Aircraft Factory

Perhaps one of the greatest of the benefits derived from the development of the first Air Board was the re-organisation of the Royal Aircraft Factory. No more wonderful centre of war could be imagined than this miniature township of aeroplane hangars, sheds, experimental shops, barracks and large aerodrome, which covered over a square mile of land at Farnborough, near Aldershot. Every possible phase of aviation was represented at Farnborough, from the unfinished drawings of the designer to the bullet-riddled plane, as it came back from

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the front. There was row after row of sloping-roofed sheds, acre upon acre of aerodrome—level as the proverbial billiard table. There were to be found huge wind tunnels, circular or square in shape, for experiments with models, where the major part of the aerial experimental work was carried on; construction of new types of machines, erecting and assembling, repair work, testing of new aircraft—from the factories of the manufacturers all over the country. Lastly, and most essentially, Farnborough was the British terminus of the Ferry. From this aerodrome almost all new British machines set out on their maiden trip for France after their acceptance by the R.F.C. supply depot.

Now, almost an entire re-organisation was effected. "The factory," Major Baird told the House of Commons early in May of 1917, "is an establishment which is under the orders of the Ministry of Munitions, and to that extent its relations with the technical department of the Air Board are precisely the same as the relations between the technical department of the Air Board and any other manufacturer. That is to say, if the factory makes a design, it is submitted to the technical advisers of the Air Board in precisely the same way as the designs of any other recognised manufacturer. But, like every other big factory, it has an experimental side. That experimental side is far larger than in the case of the ordinary commercial factory, and in addition to experiment and research carried on by the factory as such, it carries out any experiments in research work that may be required by the technical department of the Air Board.

"As a proof that research work has not been dropped, I may give the numbers employed in each of these branches as compared with what it was six months ago. In experimental engineering the number is now 90 as compared with 86 six months ago. In the experimental flight department the number is 86 as compared with 83; and in the case of the research department, dealing with aero dynamics, it is 107 as against 83, so that it will be seen there has been no reduction in these departments, or activities. As regards the ordering of machines, the policy of the factory is only to manufacture a sufficient number of machines to try the design and to embody

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any alteration which the Expeditionary Force, from their experience, find necessary to deal with the other changing requirements at the front. That in practice means, as I have explained, that we get the first batch of machines of Government design made at the factory. They do not continue to produce that machine. The drawings are handed over to the manufacturers to produce machines as contractors to the Government.

"They have produced designs, but nothing material. I agree on this point, that you cannot have too much real talent employed on the difficult work of trying to improve the machines. Whether in private factories or in Government factories does not make any difference. The great point is to have the machine as perfect as possible."

Aerial Home Defence

The remote connection between the development of the Aircraft Factory and home defence against raiding German aircraft, at first sight, may not appear too obvious. What is obvious, however, is the fact that the Royal Aircraft Factory, organised on a more practical basis, was now turning out, in conjunction with the private manufacturers, sufficient new machines even to satisfy the imperative demand of the air forces on the Western front. There happened thus a surplus of latest and up-to-date craft. Formerly, the home defence airmen had been forced to make shift with such old-type machines as could be spared them. It was fighting against unfair odds; for the raiding craft were the very latest creations of the German manufacturers.

At the beginning of 1916 the aircraft defences of this country came under the control of Field-Marshal Viscount French as Commander-in-Chief of the Home Forces. At that time, however, the command of the anti-aircraft, as differing from the actual aircraft, defences was still in dispute. Then, on February 19, 1916, it was decided that the London defences (aircraft and anti-aircraft) should be handed over to Lord French, and on February 26 it was further decided that he should be responsible for the whole of the anti-aircraft land defences of the United Kingdom. "Previous to this," Lord

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French himself remarked, in an official dispatch on the subject, "I had given considerable attention to the subject of anti-aircraft defence, and I submitted a scheme for consideration, which was approved, and has been carried out.

"During the winter there was little hostile activity in this direction, but since I assumed charge of these defences enemy airships and aeroplanes have invaded the country whenever conditions have admitted. The numbers of airships taking part in a raid have varied considerably. On April 3 only one was engaged, whilst in the raid of September 2—3 not less than 12 ships are believed to have taken part.

"In all, 19 raids have been made by German airships and 17 attacks have been made by aeroplanes. The damage done has been comparatively small, and nothing of any military importance has been affected.

"Taken as a whole, the defensive measures have been successful. In very few cases have the enemy reached their objective. They have been turned, driven off, seriously damaged by gunfire, and attacked with great success by aeroplanes. Seven have been brought down, either as the result of gunfire or aeroplane attack, or both combined.

"The work of the Royal Flying Corps and of the gun and light detachments, including the Royal Naval Anti-Aircraft Corps, has been arduous, and has shown consistent improvement; the guns and lights have been effectively handled, and the pilots of the Royal Flying Corps have shown both skill and daring. All are deserving of high praise. Close co-operation with the Navy has been maintained, and the Royal Naval Air Service by their constant and arduous patrol work on the coast and overseas, have shared in successful attacks on the enemy."

Raids on England in 1917-18

This report brings the German war in the air against British shores up to the end of December, 1916. 1917, though perhaps not so active a period in this respect, was notable for some of the most effective and daring enemy visits. The most important of these raids from January 1 until the time of the signing of the Armistice were as follows:

Air Raids and the Air Raider

Date	Number of Aircraft	Objective	Casualties	
			Killed	Injured
Mar. 1	1 plane	Broadstairs	0	6
" 16	1 plane	Westgate	No damage	
" 16	3 ships	Kent	Trivial damage	
April 5	1 plane	Kent	—	—
May 7	—	North London	1	2
" 24	5 ships	East Anglia	1	0
" 25	16 planes	S.E. of England ..	95	192
June 5	18 planes	Thames and Medway ..	13	34
" 13	—	Margate, Essex and London	162	432
" 16	3 ships	Kentish coast	3	16
July 4	—	Harwich	14	30
" 7	22 planes	London and Essex ..	57	193
" 22	15 planes	Harwich and Felixstowe	13	26
Aug. 12	20 planes	Folkestone, Margate, and Southend	32	43
" 22	10 planes	Dover and Ramsgate ..	12	25
" 22	1 ship	Yorkshire coast	—	1
Sept. 2	1 plane	Dover	12	25
" 3	6 planes	Sheerness and Chatham	132	86
" 4	20 planes	London and S.E. England	19	71
" 24	—	Kent, Essex, and London	21	70
" 24	3 ships	Yorkshire, Lincolnshire coast	0	3
" 25	—	Kent, Essex, and London	9	23
" 28	20 planes	Suffolk, Essex, and Kent	—	—
" 29	—	Kent, Essex, and London	14	87
" 30	—	London	4	38
Oct. 1	—	Essex, Kent, and London	11	41
" 19	12 ships	East, N.E., and London. The "Silent Raid," 8 enemy airships brought down or lost	36	55
" 29	—	London	—	—
" 30	1 plane	S.E. coast	—	—
" 31	30 planes	London and S.E. coast	10	22
Dec. 6	25 planes	London and S.E. coast	8	28
" 18	—	London and Essex ..	14	85
" 22	—	Kent	—	—
1918				
Jan. 28	15 planes	Kent Essex and London	67	166
" 29	15 planes	" " "	10	10
Feb. 16	6 planes	" " "	12	6

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<i>Date</i>	<i>Number of Aircraft</i>	<i>Objective</i>	<i>Casualties</i>	
			<i>Killed</i>	<i>Injured</i>
Feb. 17	6 planes	Kent, Essex and London	21	32
" 18	4 planes	London	—	—
Mar. 8	8 planes	Kent, Essex, Herts, Beds and London	23	39
" 12	1 ship	Yorkshire	1	—
" 13	1 ship	Hull	8	22
April 12	4 ships	N.E. and N.W. coasts..	7	20
May 19	8 planes	Kent and London ..	49	177
June 17	—	Kent	—	—
July 5	—	East Anglia	—	—
" 18	1 plane	Kent	—	—
" 20	1 plane	Kent	—	—

Plane, aeroplane ; ship, airship or Zeppelin

CHAPTER XIV

THE SUPREME TEST OF THE FRENCH AIR SERVICE

Cause for Alarm—The Price of French Supremacy—Delayed Supports—
—Supreme Effort—Death of Guynemer—Prowess of French Air
Service—German Hypocrisy—Aces, and the New Aces—French Air
War by Sea—A Gallant Exploit—French Aircraft at Salonika
—Battle Airmen—Nungesser—*Les Autres Aces*—Summary of
Eight Months' Activity.

By the spring of 1918 the French experts, who were ever almost uncannily accurate in these matters, computed that Germany intended to be able to put into the fighting line a total of 3,500 machines!

This statement, perhaps, loses its right significance in the light of cold print. Before the signing of the Armistice, yet fourteen months ahead in the dim uncertain future, we had grown accustomed to aerial warfare on a large scale, and manœuvres with great squadrons of twenty, thirty and forty machines at a time; an aggregate of a few hundred aircraft or so was no unusually alarming feature. In June, 1917, however, when this statement first was made, the anticipation of 3,500 new German aircraft was terrifying in its possibilities.

It was largely a matter of supply and demand peculiar to the unusual conditions of the air war. For every one such German machine employed over the firing-line, if of the chaser or fighting type, a reserve of at least three had to be maintained. The daily loss of craft on all sides was not light. An aeroplane on active service, to maintain the right fighting strength of a squadron, having been destroyed had to be replaced with another similar type of machine, stationed within a few hours' flight of the Front. Again, this machine had to be replaced immediately by another from the home aerodromes, or from the manufacturers. With reconnaissance, bombing and

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artillery direction machines, on the other hand, the percentage of loss was not so high; but a reserve had to be maintained of at least two such craft.

The enemy air fleet which, throughout the war was invariably aggressive in its tactics, was composed of sixty per cent. chaser machines to forty of other slower types. In this case, the aggregate of the new German air programme would be, not 3,500 new machines, but 5,250 chaser planes alone, exclusive of 3,500 aircraft of other types, giving a grand total of 8,750 machines!

What this great effort on the enemy's part meant to the French at this, the most critical phase of the war, can best be understood by a few general observations as to the respective strength and standing of the enemy and our Allies along the Western Front at this time. France for four long heart-breaking years had faced the fiercest fury of the tide of war. Her gallant armies, particularly at Verdun, had been killed off by thousands; to such a degree was her young manhood drained that by midsummer, 1917, beside the old men and women and children only the blind, the halt, and the maimed remained. An aggregate of hundreds of tons of munitions had been supplied by the French arsenals and factories throughout the war to every one of the Allies; even, on occasions, to Britain herself. The French aviation effort had been prodigious. Her pilots had maintained an intensive, and almost incessant bombing campaign on the German lines, reserves, supports, lines of communication and back-areas since August, 1914. The French machines were early with us in carrying the air war over German soil; and continued so to do until the inception of the Independent Force, Royal Air Force, in the autumn of the year. In fact, next to that of the British, the French air effort had been the greatest of the war, not excluding that of the enemy.

But what had that great effort cost France in craft and aviators, more particularly in energy and morale? The loss in French aircraft alone had been stupendous; in personnel most lamentable. This year, on September 11, she was to make the greatest sacrifice of all; Captain Guynemer, her world-famed "ace of aces," on that day, fell to the superior prowess of Wissemann, one of the crack German airmen. The world

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mourned with France in her great loss, but that was but small compensation.

Tired, weary, spent and bleeding, the gallant French nation faced the greatest crisis of its history. Then, with the full shock of a thunderbolt, the news was received that Germany was about to launch this new and extensive aerial campaign. Many in France and in Britain began to express the opinion that the days of France as a nation were numbered; inevitably, within a few weeks, she must be swept to the Bay of Biscay by an invincible German invading army. She had been bled dry and was incapable of further effort.

How little they really knew of that burning invincible spirit which lifted the heart of even the humblest poilu from the mud and the mire of the bloody trenches to Olympian heights of courage and of daring; of unsuspected purpose and grim determination. Is it to be surprised then that we learn that, far from bringing about the general anticipated débâcle, the new threatening German air danger revived the frayed, uncertain French moral to the highest pitch of energy and enthusiasm. In that hour France was re-incarnated, the invincible Gallic spirit leapt once more into a fierce passionate flame of patriotism under which the vaunting ambitions of Germany withered.

The Delayed Supports

While the whole world regarded the transformation with amazed astonishment, the French Government itself supplied the answer to this absorbing riddle in the simple announcement of a French official. Before the force of those few curt words, the centuries rolled back, and an old alliance—dead and forgotten since the 18th century—was revived. Already the gallant pilots of the famous Lafayette Escadrille—the truest neutrals of the war, who fought for an ideal, where a material motive would have proved but grossly immoral—had made history in the ranks of the French Air Service. Now, it was the whole American nation, and not a few generous minded individuals, who joined that sacred alliance. Said that French official, "Helped by America, we shall maintain our mastery of the air. The assistance asked of the United States includes, from the

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point of view of personnel, the dispatch of a first contingent of American pilots, who will complete their training at French flying schools, and the dispatch, already carried out, of a contingent of French instructors to the United States. America will provide equally powerful support from the point of view of material. The programme worked out and decided upon by the Flying Corps is being developed methodically, and is of a nature to inspire us with the strongest confidence and the best expectations."

As a matter of fact and as now generally known, that American aid was not forthcoming until well into the spring of 1918. But what was lacking in material was more than compensated for in French moral advantage in anticipation. It is so trite an observation, but one only can say that, in the summer and autumn of this year the gallant French aviators excelled themselves. Theirs was a well-nigh superhuman effort. Ever their accredited most successful phase of the air war, the French bombing aircraft now began to carry the war right over the heart of the enemy's country, by night rather more than by day; causing endless and wide-spread terror and destruction among the innumerable German munition centres and garrison towns along the banks of the Rhine, while the Allied—almost entirely French—raid on the Essen district of July 6 was an epic of the battle of the skies.

Supreme Effort

Throughout 1917 the chaser planes and the fighting pilots of our Allies proved brilliantly invincible. The meaning of the latter statement, perhaps, can be better appreciated when it is noted that this great victory was achieved despite the untimely, heroic deaths of two of the French giants of the air—Guynemer and Lieutenant Delorme. Though rather less famous than his youthful leader, Delorme was one of the most popular of the French airmen. On May 25 he left his aerodrome on a reconnaissance flight, and did not return. A month later he was reported officially missing. Delorme had brought down no fewer than twenty-three German machines up to a week before his death, and had been decorated with the Legion of Honour, the British Military Medal and the Croix de Guerre.

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Guynemer, the valiant and incomparable, was lost on the evening of September 11. While making a reconnaissance over the Flanders front, he gave chase to some German machines on the horizon, got separated from his companion machine, and was never seen again. No more simple, yet at the same time, beautiful memory to this immortal pilot could be made than the last official mention of General Anthoine in French Army Orders. "General Commanding Army mentions Captain Guynemer, commanding No. 3 Squadron, in General Orders of the Army," was the brusque opening phrase of this genuine tribute, which continued: "Captain Guynemer died on the field of honour on September 11, a hero of legend, who fell from the high heaven of glory after three years of ardent conflict.

"He will be remembered as the perfect symbol of the highest qualities of our race. He showed indomitable tenacity, fierce energy, and blind courage. He was animated by the firmest faith in victory, and he has bequeathed to every French soldier an imperishable memory, which will stimulate a spirit of self-sacrifice and the noblest emulation."

The French Chamber, later in the month, decided by a unanimous vote to place the name of Captain Guynemer on the commemorative tablets of the Pantheon until his body could be found and buried in that famous hall.

The Prowess of the French Air Service

It is not even too much to say that the wording of General Anthoine's generous tribute was symbolical of the whole of the French Air Service at this time. It is like building up a pyramid of solid usefulness to recount in succession each various phase of their eternal activity. For instance, as far as raiding alone was concerned the airmen achieved results equal in value to the work of an entire army corps. In a period from May to December, 1917, a very large number of raids were made by their bombing airmen, all with excellent results.

The prowess of the French airmen in driving off raiding enemy aircraft from the French capital and the eastward provincial towns was only excelled by that tenacious spirit which they one and all exhibited in the field. Night and day, in all sorts of weather, vigilant dawn, noonday and sunset air patrols

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were made of the skies over the great city and its environs. Monotonous as was this task of so strenuous a nature, it claimed for its prize the recorded fact that only on one occasion in six months did the German air-raiding pilots and machines succeed in penetrating the Paris anti-aircraft defences. A heavy mist, which almost instantly, in that curious fashion peculiar to this low-lying district, dissolved at the crucial moment when the enemy airmen were hovering over the heart of the city; and the sky patrol, on this occasion, hardly could be held responsible for an incident which so obviously was due to a misfortune of war.

The Germans naturally were jubilant over this new and unexpected success. In a *communiqué* issued from Berlin on July 28, appeared the following modest claim: "Last night bombs were dropped upon the railway stations and military establishments of Paris. Hits on the objects aimed at—'so exquisitely vague'—were observed. Our airmen returned unharmed in spite of the strong defensive fire."

This assertion, needless to remark, was inaccurate in all its details. The attempted attack caused no loss of life or material damage. Several bombs were dropped, however. One of these fell in a large store of combustibles, and another in a large courtyard. Further on a bomb played havoc among a bed of cauliflowers, and another fell in the courtyard of a factory. Two others fell in a gutter. But none of these bombs did much damage.

Moving away from Paris the raiding aeroplanes dropped more bombs on an important centre. One fell in a garden and three others in a boulevard. One of these damaged the facade of a turret and exploded, slightly injuring a woman who was in bed in a neighbouring house—the total aggregate of casualties. A little to the right of this centre three bombs fell in a large enclosure but did no serious damage.

The following evening, flushed with their success, the Germans made another and similar attempt, but the raiding aircraft were turned back before getting near Paris.

In the actual air fighting over the battle areas these were the halcyon days when the adventurous and daring Nungesser, was at his prime, the young Fonck already beginning to estab-

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lish himself as an "ace," and well started upon his meteoric career. A heavy toll of German aeroplanes were brought down by the French aviators in that period of eight months, which already has been mentioned. Yet, despite the unusually heavy call upon their slender resources, not only were spare aircraft and personnel forthcoming in sufficient numbers for the French to establish a semi-official postal service between Paris and London—this service, which was the original idea of M. D'Aubigny, the Deputy-President of the Inter-Ministerial Civil Aeronautic Commission, was employed mainly to set up a more rapid means of communication between the members of the Inter-Allied committee at Versailles and the British Cabinet in Westminster. An invaluable mission was also dispatched to assist in the instruction and training of young airmen in America. Again, this is without taking into account either the work of the French land and sea machines in the Salonika campaign, where they co-operated with the efforts of the British R.F.C. and the R.N.A.S., or of the patrol work of their naval aircraft at sea.

French Air War by Sea

The naval wing of the French Air Service, though small in numbers, was a highly efficient unit. What they lacked in equipment it may be said they amply compensated for in the initiative and determination displayed by their pilots. May, June and August were the most successful months of the French air war by sea. In all weathers, during May the French seaplane patrol service at various centres carried out 2,627 flights, averaging $1\frac{3}{4}$ hours per flight. On fourteen occasions German submarines were attacked with some small measure of success, whilst in three cases they succeeded in locating enemy minefields. An enemy cruiser also was attacked from the air. Eight night bombardments were carried out on German bases in Belgium, whilst as the result of three air battles two enemy machines were destroyed.

In the month following 3,139 flights were made by French seaplanes. German submarines also were attacked on ten occasions, in six of which the French airmen discovered German minefields; and they also took part in nine night

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bombardments of German bases. They also carried out some reconnaissances at a considerable distance from their base. During the same period French naval airships made 141 trips, representing a total of 483 hours in the air. While, apart from a successful attack on a German submarine in the Mediterranean by a French dirigible from the Naval Air Station at Corfu on the morning of August 10, another sister aircraft of the same class, the "Lorraine," of the Naval Air centre at Bizerta, returning at nightfall of the 3rd, from the patrol of a convoy of merchant ships, sighted a U-boat and bombed it repeatedly. Several successful hits were observed. The "Lorraine" then wirelessly the position of the enemy submarine to some French destroyers which were cruising in the offing. These latter dashed in at full speed and sank the enemy craft with their gunfire. In August altogether there occurred 17 such engagements between French seaplanes or dirigible airships and enemy U-boats.

A Gallant Exploit

At least one gallant exploit on the part of a French naval aviator must be found space for in these crowded pages. It happened in the course of a combined Allied air attack on Zeebrugge, one morning in early April. The young officer who figured so brilliantly in the action was the only son of a French nobleman of the south of France, who was closely connected with a well-known British Army family. "A British aeroplane was hit," was the statement of a correspondent of *The Times*, who witnessed the engagement throughout, and went on to describe it as follows: "It fell with its occupants into the sea. The position was so dangerous, and the enemy's fire so heavy, that the French Commandant forbade any attempt at relief. A French Enseigne de Vaisseau, however, in defiance of orders, went with his seaplane to the rescue, and succeeded in getting the British officers on to his craft. The machine being later disabled, they were all taken prisoners by the Germans.

"The French Commandant, in writing to the Enseigne's father, described his son's conduct as heroic. The fire was terrific, the young man's action was watched with the greatest anxiety, and the escape of the whole party from wounds was

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miraculous. After speaking in the highest terms of the young officer's conduct the Commandant added that as an order had been disobeyed it would have been necessary, had he returned, to place him under arrest. The further duty had remained to report his conduct, with the result shown in the orders of superior authority. These included an Army Order of the day, recounting the exploit, and adding the palm to the Croix de Guerre, already earned by the Enseigne, and a degree appointing him Chevalier of the Legion of Honour. An order of the Minister of Marine of a few days' later date promoted the Enseigne de Vaisseau to the rank of lieutenant as a specially deserving case.

"His services," this correspondent continued, "have also been recognised by the King, who has been pleased to create him a member of the D.S.O. and to confer upon his observer the D.S.M. The King has also conferred the D.S.M. on the crew of the companion seaplane."

French Aircraft at Salonika

It is hardly to be expected that in an out-of-the-way corner like Salonika, when the interest of the whole world was centred on the grim struggle being waged on the Western Front, that the air campaign in Macedonia provided any unusual thrill or sensation. It was not, however, without its brilliant aerial successes or adventures, and some of the most daring air feats of the war were accomplished. In fact, it was the grim icy determination which, while the enemy both respected and feared, consistently checkmated the enemy's every effort. In Salonika the air war was more useful than brilliant.

Not only were the Germans frustrated in their cunning plan to establish submarine bases along the Aegean Sea, which bases would have caused havoc amongst the Allied shipping in the Mediterranean; but also very considerable numbers of Bulgarian and German troops were kept fully occupied in doing nothing. What was even more important, these same forces were kept diverted from reserves to the Western Front. In the nature of the case it is not surprising to find that the Salonika campaign throughout was more or less spasmodic in its nature, and especially so in the air. The battle of the skies

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was one rather of isolated events than of the protraction of any definite campaign. It is impossible to give that campaign adequate description, which appears so much like a diary of events. And in that manner it will be furnished the reader.

As will be observed, apart from a brief period in late November, the major part of the aircraft activity in Macedonia was crowded into two months, July and August. For the rest the principal aerial events were as follows:

- June 25 .. Allied aviators successfully bombed numerous enemy positions.
- July 10 .. Aerial bombardment of Petrich.
- „ 11 .. Enemy aeroplane brought down near Livadi.
- „ 12 .. Airmen bombed Angista railway station.
- „ 16 .. Enemy aeroplane brought down near Angista.
- „ 18 .. Raid on Angista.
- „ 20 .. Raid on Petrich.
- „ 22 .. Two enemy machines brought down. Raid on motor-car park at Demirhissar.
- „ 28 .. German encampments region of Rupel bombarded from the air.
- Aug. 2 .. Bombardment of enemy installations north of Monastir.
- „ 3 .. Allied aviators bombed enemy camps region Demirhissar.
- „ 4 .. British aviators bombed Yenekoi, 20 miles north of Petrich.
- „ 9 .. Livanove aerodrome raided.
- „ 11 .. Enemy hangars bombed near Drama.
- „ 16 .. 23 French and 5 Italian aeroplanes bombed Pogradec.
- „ 20 .. Fifty Allied planes dropped 1½ tons of bombs region Prilep.
- „ 21 .. French and British aviators bombed enemy staff headquarters at Prilep.
- „ 24 .. British aircraft bombed enemy establishments near Demirhissar.
- „ 25 .. British airmen bombed enemy depots at Doiran.
- „ 31 .. German aeroplane brought down.
- Sept. 11 .. Bombardment of enemy camps near Rupel.
- „ 21 .. Bombardment of enemy establishments.
- „ 26 .. Serbian airmen bombed successfully enemy cantonments Doiran and Nonti.

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- Nov. 20 ... Bombs dropped on the Struma valley.
„ 22 .. German machine brought down.
„ 23 .. Two German aeroplanes brought down.
„ 25 .. Enemy establishments bombed at Varsareci.
„ 26 .. Drama valley station bombed.
„ 28 .. Enemy aeroplane brought down in the region of Monastir.
„ 30 .. Several air bombardments in Vardar valley and at Monastir.
Dec. 1 .. British airmen bombed Rupel and railway-line from Drama to Seres.

Battle Airmen of the French Air Service

Perhaps the most interesting feature of all the great French air campaign of 1917 lay in the fact of the unusual variety of its effort. Already we have seen something of the work of the French naval aviators at sea. Their indefatigable energy has been aptly illustrated by the variety of difficult and dangerous tasks that they undertook; as, for instance, the various side shows as the Paris-London aerial post, and the American aeronautical mission. No further proofs were necessary of the valuable work of their aviators in Macedonia. We have now to consider perhaps the most inspiring and thrilling of all phases, the work of the French battle airmen over the lines; a tale full of romance.

Nungesser has been mentioned. His personal story may be taken as illustrating to a certain degree the prowess and methods of the leading French fighting pilots of the period.

The French super-airman survived longer than any of the other great "aces" of the war with the single exception of Noel. As runner-up for the coveted position of "ace of aces," Nungesser met only with misfortune. As, after a determined struggle, his total of victories was gradually creeping up to that of the heroic champion Guynemer, he was grievously wounded. And when he had recovered his health and strength again it was only to find that Fonck had placed himself in an unassailable position during the long interval of his absence.

Nevertheless, despite his seventeen wounds, Nungesser came out of the war with 45 enemy machines to his credit; in the interval had been appointed an Officer of the Legion of Honour;

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been awarded a Military Medal, and 22 times cited in the French Order of the Day.

Nicknamed the "Little Hussar," Nungesser won the distinction in the most unusual fashion. In the course of an action in the early stages of the war he and his lieutenant found themselves cut off in the enemy lines. His officer was badly wounded, but Nungesser managed to struggle with him to a place of safety; and in retreating they passed through a village where they saw a German staff car standing outside an inn, into which the driver and the occupants had gone for a drink. He jumped in and drove the car himself to French headquarters, represented himself as a spy—knowing that with his bedraggled appearance he would never otherwise gain admission to the General—gave his report, handing in the valuable papers found in the car, which disclosed a very neat little plan for the demolition of Paris, and received the Médaille Militaire, never before granted after one month of service, and the gift of the car.

On one occasion he came down within the French lines with a broken leg, contusions all over his body, and a yet more horrible wound—the control lever of the aeroplane having been driven through his palate. However, thanks to an unusually strong constitution, he survived, and after three months' inactivity, at which he chafed greatly, he announced his intention to return.

This was scouted as madness, but a few days later this man, who could hardly drag himself on crutches, was in the air again. "Before a fortnight," he asserted, "I will have my Boche;" and in a few days he brought down a sinister L.V.G. Two days later, and within the week, on a light monoplane, he attacked a heavy Hun bomber, an "aerobus," he called it, armed with machine-guns. There was a short sharp duel, and a little later Nungesser was seen among the woods of Hauts-Fourneaux with a camera, intent on photographing the debris of the victim.

Les Autres Aces

As results will show, there was no shortage of fighting pilots of the same calibre in the French aviation service at this period. For instance, there was the case of Sergeant Boyeau,

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once a prominent Rugby player, now the "Sausage Specialist"—crack pilot in destroying enemy observation balloons—of the French Army. Boyeau, who entered the Flying Service after two years in the trenches, attacked enemy "sausage" balloons on a plan which he worked out for himself, and had so far destroyed five of them. On the occasion of one of his successful attacks Boyeau was obliged to land in the enemy's lines owing to engine trouble. He made the necessary repairs under the fire of the German anti-aircraft guns and then, flying at a height of not more than 400 feet, succeeded in getting back to his own lines. For this enterprise he received the *Médaille Militaire*.

In October special gold watches were presented by the Aero Club of France to Captain Personne and Sous-Lieutenants Ortolli, Coupot and Noel. Sous-Lieutenant Noel, the "doyen" of French airmen, with a magnificent record, the holder of the Cross of the Legion of Honour, the Military Medal, the Russian Cross of St. George, and a number of other decorations, flew from Salonika carrying a message to Bucharest and bombed Sofia, the Bulgarian capital, on his way. Noel first learned to fly in 1910, joined the French Air Service on the outbreak of war, and remained a front line pilot to the end of the war, which found him machine-gunning Bulgars up the defiles in the Balkans at the age of forty-seven years. Tragedy the same month overtook another of the great French "aces" in the person of Chemet, who was drowned in the Rhine while attempting to escape from Germany in company with a friend taken prisoner on the French front. Chemet had been interned at Dillingen, Bavaria. At the end of about ten days he escaped, and after a tramp of 75 miles across Southern Germany, passed through Austria, near Bregenz, and reached Switzerland. He then had to traverse the Rhine to the south of Lake Constance. Not being able to swim, Chemet, although provided with a swimming apparatus, was unable to battle against the strong current of the river, and being carried away by it was drowned.

Summary of Eight Months' Activity

The French battle pilots particularly distinguished themselves on the Aisne front on the first two days of September.

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High and low, from the trenches to far above the clouds, the French aircraft ranged the sky. In one instance, the enemy was attacked with machine-guns in his trenches and at his batteries from a low altitude varying from 300 to 1,800 feet. Every French machine that day returned in safety! On September 2 a German aeroplane was brought down from a height of over 6,500 feet by a motor-gun of the 42nd section. Another, which was flying over the French lines at over 16,250 feet was hit and brought down by an explosive shell. When, on November 2, the French officially reported that: "In the course of the Malmaison battle our aviators, with great daring, attacked with their machine-guns the enemy's troops, bombarded his railway stations and places of assembly, and took part in 611 aerial flights," this great effort reached its climax.

In the ten months which ended on October 31, the French destroyed no fewer than 120 German aeroplanes over their own lines, and 397 over the enemy lines, the destruction of these latter craft being fully confirmed. No less than 513 other enemy machines were brought down over the lines on the German side and probably destroyed. However, confirmation of these was unobtainable. The largest totals were in May, when 18 were shot down in the French lines, 78 in the German lines, and 102 were disabled and probably destroyed. Twenty-two German captive balloons were also destroyed. To this total also should be added 20 enemy aeroplanes brought and 57 driven down in November; and 54 brought and 20 driven down in December. In the latter month, in a period from the 21st to the 23rd, the French chaser planes showed extraordinary activity, engaging in over a hundred fights, most of them behind the German lines.

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